IUCLID

Data Set

Existing Chemical	:	ID: 25154-52-3
CAS No.	:	25154-52-3
EINECS Name	:	nonylphenol
EC No.	:	246-672-0
TSCA Name	:	Phenol, nonyl-
Molecular Formula	:	C15H24O

Producer related part

Company	:	Epona Associates, LLC
Creation date	:	15.12.2003

Substance related part

Company	:	Epona Associates, LLC
Creation date	:	15.12.2003
Status	:	
Memo	:	SOCMA MCC
Printing date	:	07.09.2006
Revision date	:	
Date of last update	:	07.09.2006
Number of pages	:	50
Chapter (profile)	:	Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

07.09.2006

1.0.2 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

1.1.0 SUBSTANCE IDENTIFICATION

1.1.1 GENERAL SUBSTANCE INFORMATION

Purity type	:	
Substance type	:	organic
Physical status	:	liquid
Purity	:	
Colour	:	clear to pale yellow
Odour	:	slight phenolic
Source	:	Epona Associates, LLC EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability	:	(2) valid with restrictions Data taken from EU Risk Assessment Report

15.12.2003 (13)

Purity type	:	
Substance type	:	organic
Physical status	:	solid
Purity	:	
Colour	:	
Odour	:	
Source	:	EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

11.02.2000

1.1.2 SPECTRA

1.2 SYNONYMS AND TRADENAMES

2,6-dimethyl-4-heptylphenol; nonyl phenol; Nonil fenolo (Italian)

Source	:	Enichem S.p.A. Milan EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

29.05.1994

2,6-Dimithyl-4-Heptylphenol

Source : B.V. CONSOLCO Amsterdam
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

28.02.1997

Hydroxyl No. 253

Source : Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

29.06.1995

Isononylphenol

Source : Henkel KGaA Duesseldorf
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

06.12.1996

Monononylphenol

Source : Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

13.11.1995

n-Nonylphenol

Source : Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

13.11.1995

Nonylphenol

Source : Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

21.04.1998

Nonylphenol (Isomere)

Source : Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

29.06.1995

Nonylphenol, branched

Remark : Fuer die Substanz gilt als weitere CAS-Nummer:
CAS-Nr. : 11066-49-2
EINECS-Nr: 234-284-4 (Phenol, isononyl-)

para-Verbindung : ca. 90 %
ortho-Verbindung: ca. 10 %

Source : Henkel KGaA Duesseldorf
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

06.12.1996

Nonylphenol, branched

Source : Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

12.05.1997

Nonylphenol, Isomerengemisch

Source : Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

07.10.1994

Nonylphenol, mixture of isomers

Source : Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

29.06.1995

Phenol, nonyl-

Source : Morton International Limited Hounslow
Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

03.06.1998

Phenol, Nonyl- (Isomere)

Source : Henkel KGaA Duesseldorf
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

29.06.1995

Remark : Nonylphenol
Phenol, nonyl-, branched CAS-No 90481-04-2,
EINECS-No 2918440
Phenol, 4-nonyl-, branched CAS-No 84852-15-3,
EINECS-No 2843255
2,6-Dimethyl-4-Heptylphenol

Source : Berol Nobel AB Stenungsund
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

10.05.1994

1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

1.6.2 CLASSIFICATION

1.6.3 PACKAGING

1.7 USE PATTERN

1.7.1 DETAILED USE PATTERN

1.7.2 METHODS OF MANUFACTURE

1.8 REGULATORY MEASURES

1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

1.11 ADDITIONAL REMARKS

1.12 LAST LITERATURE SEARCH

1.13 REVIEWS

2.1 MELTING POINT

Value	:	ca. -8 °C
Decomposition	:	no, at °C
Sublimation	:	no
Method	:	other: DIN IOS 3016
Year	:	1994
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Source	:	Epona Associates, LLC
Reliability	:	(2) valid with restrictions Data taken from EU Risk Assessment Report
Flag	:	Critical study for SIDS endpoint

15.12.2003 (13) (17)

Value	:	= 2 °C
Sublimation	:	
Method	:	
Year	:	
GLP	:	no data
Test substance	:	
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

16.03.1994 (10)

Value	:	= 24.5 °C
Decomposition	:	no, at °C
Sublimation	:	no
Method	:	other: Based on USEPA TSCA Environmental Fate Test Guidlines (USEPA 1985)
Year	:	1990
GLP	:	yes
Test substance	:	
Remark	:	Measurement of Crystalisation point.
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.

12.05.1997 (1)

2.2 BOILING POINT

Value	:	= 290 - 302 °C at 1013 hPa
Decomposition	:	no
Method	:	
Year	:	1994
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4

Remark	:	"Actual boiling/decomposition range will depend on the purity and origin of the material and the values quoted here can be considered representative of the commercially available material"
Source	:	Epona Associates, LLC Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA) Data taken from EU Risk Assessment Report
Flag	:	Critical study for SIDS endpoint

15.12.2003 (13) (17)

Value	:	293 - 297 °C at
Decomposition	:	
Method	:	other: no data
Year	:	1989
GLP	:	no data
Test substance	:	as prescribed by 1.1 - 1.4

Remark	:	"Actual boiling/decomposition range will depend on the purity and origin of the material and the values quoted here can be considered representative of the commercially available material"
Source	:	Epona Associates, LLC Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability	:	(2) valid with restrictions Data taken from EU Risk Assessment Report

15.12.2003 (13) (41)

Value	:	= 295 °C at
Decomposition	:	
Method	:	other: no data
Year	:	1991
GLP	:	no data
Test substance	:	as prescribed by 1.1 - 1.4

Remark	:	"Actual boiling/decomposition range will depend on the purity and origin of the material and the values quoted here can be considered representative of the commercially available material"
Source	:	Epona Associates, LLC Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability	:	(2) valid with restrictions Data taken from EU Risk Assessment Report

15.12.2003 (10) (13)

Value	:	°C at 1013 hPa
Decomposition	:	yes
Method	:	other: USEPA (1989, 40 CFR 796.1220) with modifications for the high temperatures required.
Year	:	1990
GLP	:	yes

Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	"Actual boiling/decomposition range will depend on the purity and origin of the material and the values quoted here can be considered representative of the commercially available material" Three initial trials were run. In all cases the test substance decomposed before the boiling point was reached. at temperatureS ranging from 215 to 233 (mean 230) deg C. In a subsequent trial, decomposition of the test material was observed at temperatures ranging from 558 to 568 K (283 to 295 deg C). The boiling point was reported as being greater than 573 K (300 deg C). However data from this study indicate that the test substance will thermally decompose before boiling.
Source	:	Epona Associates, LLC ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.
Reliability	:	(2) valid with restrictions Data taken from EU Risk Assessment Report

15.12.2003 (1) (13)

2.3 DENSITY

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Value	:	ca. .0016 hPa at 20 °C
Decomposition	:	
Method	:	other (calculated): Linear regression using Clausius-Clapeyron equation
Year	:	1994
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	The value at 20 degree C is an estimate obtained by extrapolation of the data given in the reference: 301.9 degree C: 1013 hPa 275.8 degree C: 533 hPa 249.1 degree C: 267 hPa 226.0 degree C: 133 hPa 199.1 degree C: 53.2 hPa 180.8 degree C: 26.6 hPa 164.7 degree C: 13.3 hPa 149.7 degree C: 6.7 hPa log (VP) = -3475.88 (1/T) + 9.0693 (T in K, VP in hPa)
Source	:	Epona Associates, LLC ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability	:	(2) valid with restrictions Starting data from collection of experimental data, accepted

extraplation method, good correlation
Flag : Critical study for SIDS endpoint
15.12.2003 (13) (18)

Value : < .01 hPa at 20 °C
Decomposition :
Method :
Year :
GLP : no
Test substance :

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
21.02.1994 (17)

Value : = 1.01 hPa at 20 °C

Remark : This vapour pressure value is too high by approximately 2 orders of magnitude (see boiling point and its correlation with vapour pressure).
Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
16.03.1994 (10)

Value : ca. .0000455 hPa at 25 °C
Decomposition :
Method : other (measured): USEPA 40 CFR 795.1950 - Gas saturation apparatus method
Year : 1990
GLP : yes
Test substance :

Remark : The mean vapour pressure was calculated from the experimental data to be 4.55 x 10 -3 (standard deviation = 3.54 x 10 -3, percent realative standard deviation = 77.8)
The relatively high variability of the mean vapour pressure measurement was probably due to the low volatility of the test substance.
Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance : para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.
12.05.1997 (1)

2.5 PARTITION COEFFICIENT

Partition coefficient :
Log pow : = 3.28 at 20 °C
pH value :
Method : OECD Guide-line 107 "Partition Coefficient (n-octanol/water), Flask-shaking Method"
Year : 1981

GLP : no
Test substance :

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

21.02.1994 (26)

Partition coefficient :
Log pow : 3.8 - 4.77 at 25 °C
pH value : -
Method : other (measured): see text
Year : 1990
GLP : yes
Test substance :

Remark : The ocatanol/water partition coefficient (Kow) of NP was determined at two concentrations in accordance with USEPA guidelines. Test vessels (25 ml Teflon centrifuge tubes) contained 18 ml of pH buffer, 1.9 ml of n-octanol, and 100 ul of a stock solution of 4-nonylphemol in n-octanol. Test vessels were agitated for one hour at 25 deg C and centrifuged at 10,000g for 30 minutes. The test substance was quantified in samples of Octanol and water from each vessel by high pressure liquid chromatography. The test substance was below the detection limit (32.5 ug/l) in all water samples. Therefore Kow values were reported as "greater than" values. Results of the study are summarised below.

	Mean log Kow	
Nominal pH	C1 (high)	C2 (low)
5	>4.77	>3.86
7	>4.70	>3.80
9	>4.75	>3.84

The data showed concentration dependence because the test substance was non-detectable in all water samples and the value < 32.5 ug/l was used to calculate Kow.

Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test substance : para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.

12.05.1997 (6)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in :
Value : = 11 mg/l at 20 °C
pH value :
concentration : at °C
Temperature effects :

Examine different pol.	:	
pKa	:	at 25 °C
Description	:	of very low solubility
Stable	:	
Deg. product	:	
Method	:	OECD Guide-line 105
Year	:	1981
GLP	:	no
Test substance	:	

Source : Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
21.02.1994 (22)

Solubility in	:	
Value	:	= 11 mg/l at 20 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	4.53 at 25 °C
Description	:	of very low solubility
Stable	:	
Deg. product	:	
Method	:	OECD Guide-line 105
Year	:	1981
GLP	:	no
Test substance	:	

Source : Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
12.05.1997 (22)

Solubility in	:	
Value	:	6.237 mg/l at 25 °C
pH value	:	= 7
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	of low solubility
Stable	:	
Deg. product	:	
Method	:	other: Based upon USEPA TSCA Environmental fate gulidlines (USEPA, 1985)
Year	:	1990
GLP	:	yes
Test substance	:	

Remark	:	The mean solubility (ug/l) for 4-nonlyphenol at pH 5, pH7 and pH 9 was 4600 +/- 106, 6237 +/- 691, and 11897 +/- 3480 respectively.
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.

12.05.1997 (1)

Solubility in	:	
Value	:	3.93 mg/l at 25 °C
pH value	:	
concentration	:	other: In artificial sea water at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	of low solubility
Stable	:	
Deg. product	:	
Method	:	other: Based on USEPA TSCA Environmental Fate Test Guidelines
Year	:	1990
GLP	:	yes
Test substance	:	
Remark	:	The seawater solubilty value was calculated as the mean dissolved 4-nonylphenol concentration in the three test samples following HPLC analysis of artificial seawater flowing over a column packed with nonlylphenol. The solubility of 4-nonylphenol in the artificial seawater was determined to be 3.63 mg/l (standard deviation 0.38 mg/l, %RSD 10.5).
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.

12.05.1997 (7)

Solubility in	:	Water
Value	:	ca. 3 mg/l at 20 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	
Deg. product	:	
Method	:	other: Directive 92/69/EEC
Year	:	1992
GLP	:	no
Test substance	:	
Source	:	Huels AG Marl ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability	:	(1) valid without restriction Guideline study, SOP available

15.12.2003 (20)

2.6.2 SURFACE TENSION

2.7 FLASH POINT

2.8 AUTO FLAMMABILITY

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

2.11 OXIDIZING PROPERTIES

2.12 DISSOCIATION CONSTANT

2.13 VISCOSITY

2.14 ADDITIONAL REMARKS

3.1.1 PHOTODEGRADATION

Type	:	air
Light source	:	
Light spectrum	:	nm
Relative intensity	:	based on intensity of sunlight
INDIRECT PHOTOLYSIS		
Sensitizer	:	OH
Conc. of sensitizer	:	500000 molecule/cm³
Rate constant	:	= .0000000000999 cm³/(molecule*sec)
Degradation	:	= 50 % after .3 day(s)
Deg. product	:	
Method	:	other (calculated): AOP Computer Program, Vers. 1.53, Syracuse Research Center (basedon Reference)
Year	:	1994
GLP	:	
Test substance	:	
Remark	:	half-life refers to 12 hour-days
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

16.02.1994 (2)

3.1.2 STABILITY IN WATER

3.1.3 STABILITY IN SOIL

3.2.1 MONITORING DATA

3.2.2 FIELD STUDIES

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type	:	fugacity model level III
Media	:	
Air	:	% (Fugacity Model Level I)
Water	:	% (Fugacity Model Level I)
Soil	:	% (Fugacity Model Level I)
Biota	:	% (Fugacity Model Level II/III)
Soil	:	% (Fugacity Model Level II/III)
Method	:	other: modeling
Year	:	2003
Result	:	Level III Fugacity Model:

	Mass Amount (percent)	Half-Life (hr)	Emissions (kg/hr)
Air	0.53	4.97	1000
Water	17.4	360	1000

Soil 39.4 360 1000
Sediment 42.7 1.44e+003 0
Persistence Time: 440 hr

Source : Epona Associates, LLC
Reliability : (2) valid with restrictions
Modeled data
Flag : Critical study for SIDS endpoint
15.12.2003 (11)

3.3.2 DISTRIBUTION

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type : aerobic
Inoculum : activated sludge, adapted
Concentration : 20 mg/l related to DOC (Dissolved Organic Carbon)
related to
Contact time :
Degradation : = 78 (±) % after 40 day(s)
Result :
Deg. product :
Method : Directive 84/449/EEC, C.5 "Biotic degradation - modified Sturm test"
Year : 1984
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : + emulsifier;
after adaptation in the Zahn-Wellens test
Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
21.02.1994 (24)

Type : aerobic
Inoculum : activated sludge, domestic, non-adapted
Concentration : 34 mg/l related to Test substance
related to
Contact time :
Degradation : = 7 (±) % after 28 day(s)
Result :
Deg. product :
Method : ISO Draft "BOD Test for insoluble substances"
Year :
GLP : no
Test substance : other TS: Huels AG

Source : Huels AG Marl
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance : As reported by Huels AG for CAS No. 25154-52-3
Reliability : (1) valid without restriction
Comparable to Guideline Study

12.05.1997 (19)

3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	flow through
Species	:	Cyprinodon variegatus (Fish, estuary, marine)
Exposure period	:	96 hour(s)
Unit	:	mg/l
NOEC	:	.24
LC50	:	.31
Limit test	:	
Analytical monitoring	:	yes
Method	:	other
Year	:	1990
GLP	:	yes
Test substance	:	
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition	:	Flow through, unaerated. Nominal concentrations of test substance were 0.00 mg/l, 0.075, 0.125, 0.19, 0.31, and 0.5 mg/l. Mean measured concentrations were used for all calculations. Water quality parameters were within acceptable limits throughout the test.
Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.

12.05.1997 (5)

Type	:	flow through
Species	:	Pimephales promelas (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
LC50	:	= .135
Limit test	:	
Analytical monitoring	:	no data
Method	:	
Year	:	1984
GLP	:	no data
Test substance	:	no data
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

30.06.1993 (16)

Type	:	semistatic
Species	:	Leuciscus idus (Fish, fresh water)
Exposure period	:	14 day(s)
Unit	:	mg/l
NOEC	:	= .25
LOEC	:	= .35
Limit test	:	
Analytical monitoring	:	no
Method	:	OECD Guide-line 204 "Fish, Prolonged Toxicity Test: 14-day Study"
Year	:	1984

GLP	:	no
Test substance	:	
Remark	:	Endpoint: Mortality, weight, changes in behavior
Source	:	Huels AG Marl ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance	:	As reported by Huels AG for CAS No. 25154-52-3
Reliability	:	(1) valid without restriction Comparable to Guideline Study

12.05.1997 (21)

Type	:	static
Species	:	Leuciscus idus (Fish, fresh water)
Exposure period	:	48 hour(s)
Unit	:	mg/l
LC0	:	= .8
LC50	:	= .95
LC100	:	= 1.1
Limit test	:	
Analytical monitoring	:	no data
Method	:	other: DIN 38412, Teil 15
Year	:	1987
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	+ solubilizer (acetone = 2-propanone)
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

21.02.1994 (25)

Type	:	static
Species	:	Salmo gairdneri (Fish, estuary, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
LC50	:	= .56 - .92
Limit test	:	
Analytical monitoring	:	no data
Method	:	
Year	:	1980
GLP	:	no data
Test substance	:	no data
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

30.06.1993 (12)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	
Species	:	Daphnia magna (Crustacea)
Exposure period	:	48 hour(s)
Unit	:	µg/l

EC0	:	< 100
EC50	:	= 140
EC100	:	>= 400
Analytical monitoring	:	no
Method	:	Directive 84/449/EEC, C.2 "Acute toxicity for Daphnia"
Year	:	1992
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	+ solubilizer (acetone = 2-propanone)
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

21.02.1994 (23)

Type	:	
Species	:	Mysidopsis bahia (Crustacea)
Exposure period	:	96 hour(s)
Unit	:	mg/l
NOEC	:	.018
EC50	:	.043
Analytical monitoring	:	yes
Method	:	other
Year	:	1990
GLP	:	yes
Test substance	:	
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition	:	Flow through, unaerated. Nominal concentrations of test substance were 0.00 mg/l, 0.006, 0.010, 0.016, 0.025, and 0.042 mg/l. Mean measured concentrations were used for all calculations. Water quality parameters were within acceptable limits throughout the test.
Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.

12.05.1997 (5)

Type	:	
Species	:	other: Hyalella azteca (Saussure)
Exposure period	:	96 hour(s)
Unit	:	mg/l
EC50	:	.15
Analytical monitoring	:	yes
Method	:	other
Year	:	1994
GLP	:	yes
Test substance	:	
Remark	:	The acute toxicity of NP to Hyalella azteca (Saussure occurred at concentrations in the range of 0.089 to 0.39 mg/l, with a calculated LC50 of 0.17 mg/l and an EC50 of 0.15 mg/l.
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.

12.05.1997 (8)

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species	:	Scenedesmus subspicatus (Algae)
Endpoint	:	biomass
Exposure period	:	72 hour(s)
Unit	:	mg/l
EC10	:	= .5
EC50	:	= 1.3
EC90	:	= 3.2
Limit test	:	
Analytical monitoring	:	no data
Method	:	other: Algenwachstums-Hemmtest nach UBA (Verfahrensvorschlag StandFebruar 1984)
Year	:	1989
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

21.02.1994 (24)

Species	:	Selenastrum capricornutum (Algae)
Endpoint	:	growth rate
Exposure period	:	96 hour(s)
Unit	:	mg/l
EC50	:	.41
Limit test	:	
Analytical monitoring	:	yes
Method	:	other
Year	:	1990
GLP	:	yes
Test substance	:	
Remark	:	Algae transfered from the test flasks the highest test concentration to a falsk containing fresh media without NP, grew from 9,700 to 1,940,000 cells per ml during the 7 days following the conclusion of the test, indicating a lack of algaestatic effect.
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition	:	Static, unaerated. Nominal concentrations of test substance were 0.00 mg/l, 0.06, 0.12, 0.25, and 0.50 mg/l. Mean measured concentrations were used for all calculations. Water quality parameters were within acceptable limits throughout the test. Cell counnts were made daily with a haemocytometer.
Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by

subsequent gas chromatography analysis.

12.05.1997 (5)

Species	:	Skeletonema costatum (Algae)
Endpoint	:	growth rate
Exposure period	:	96 hour(s)
Unit	:	mg/l
EC50	:	.027
Limit test	:	
Analytical monitoring	:	yes
Method	:	
Year	:	1990
GLP	:	yes
Test substance	:	
Remark	:	Algae transfered from the test flasks containing the highest concentration of NP that allowed any algal survival, (nominal concentration 0.12 mg/l NP), to a flask containing fresh media without NP, grew from 15,950 to 1,220,000 cells per ml during the 48 hours following the conclusion of the test, indicating a lack of algaestatic effect.
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition	:	Static, unaerated. Nominal concentrations of test substance were 0.00 mg/l, 0.015, 0.030, 0.060, and 0.12 and 0.24 mg/l. Mean measured concentrations were used for all calculations. Water quality parameters were within acceptable limits throughout the test.
Test substance	:	para-Nonylphenol provided by Schenectady Chemical Company. Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.

12.05.1997 (5)

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

4.5.1 CHRONIC TOXICITY TO FISH

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

5.1.1 ACUTE ORAL TOXICITY

Type	:	LD50
Value	:	= 1900 mg/kg bw
Species	:	rat
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	OECD Guide-line 401 "Acute Oral Toxicity"
Year	:	1981
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

31.01.1994 (30)

Type	:	LD50
Value	:	= 1537 mg/kg bw
Species	:	rat
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	other: no data; observ. period: 14 days
Year	:	1962
GLP	:	no
Test substance	:	no data
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

28.01.1994 (37)

Type	:	LD50
Value	:	= 580 mg/kg bw
Species	:	rat
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	other: no data
Year	:	
GLP	:	no data
Test substance	:	no data

Source : Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
28.01.1994 (40)

Type : LD50
Value : = 1300 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other: no data
Year :
GLP : no data
Test substance : no data

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
10.02.1994 (36)

Type : LD50
Value : = 1246 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other: Guidelines of the USA Interagency Regulatory Liaison Group (IRLG)Testing Standards and Guidelines Work Group
Year : 1981
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
10.02.1994 (38)

Type : LD50
Value : = 2462 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other: no data
Year :
GLP : no
Test substance : no data

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl

EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
31.01.1994 (14)

Type : LD50
Value : = 1882 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : OECD Guide-line 401 "Acute Oral Toxicity"
Year : 1981
GLP : yes
Test substance : as prescribed by 1.1 - 1.4

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
20.04.1994 (3)

Type : LD50
Value : = 1525 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other: no data
Year :
GLP : no
Test substance : no data

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
10.02.1994 (15)

Type : LD50
Value : 1000 - 2500 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other
Year : 1984
GLP : yes
Test substance : other TS

Remark : Value cited is for male rats. The range represents the highest dose tested with no deaths and the lowest dose with 100% mortality which provides an approximate 95% confidence limit. The acute oral toxicity to female rats was calculated to be 1814 mg/kg (95% confidence limits 1092-3141 mg/kg).
Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire

Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test substance : Nonyl phenol technical grade - ex ICI plant
20.04.1994 (33)

Type : LD50
Value : 1000 - 2500 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other
Year : 1984
GLP : yes
Test substance : other TS

Remark : Value cited is for male rats The range represents the highest dose tested with no deaths and the lowest dose with 100% mortality which provides an approximate 95% confidence limit. The acute oral toxicity to female rats was calculated to be 1639 mg/kg (confidence limits 1035 -2582 mg/kg).
Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance : Commercial samples - ex Rohm & Haas Co
20.04.1994 (33)

Type : LD50
Value : 1000 - 5000 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other
Year : 1979
GLP : no data
Test substance : other TS

Remark : Male and female rats
Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance : Nonyl phenol technical grade - ex ICI plant
15.03.1994 (35)

Type : LD50
Value : 1000 - 2500 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other
Year : 1984
GLP : yes
Test substance : other TS

Remark	:	Value cited is for male rats The range represents the highest dose tested with no deaths and the lowest dose with 100% mortality which provides an approximate 95% confidence limit. The acute oral toxicity to female rats was calculated to be 1814 (95% confidence limits 1092-3141) mg/kg.
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance	:	Nonyl phenol technical grade - ex ICI plant
12.05.1997		(33)
Type	:	LD50
Value	:	1000 - 2500 mg/kg bw
Species	:	rat
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	other
Year	:	1984
GLP	:	yes
Test substance	:	other TS
Remark	:	Value cited is for male rats The range represents the highest dose tested with no deaths and the lowest dose with 100% mortality which provides an approximate 95% confidence limit. The acute oral toxicity to female rats was calculated to be 1639 (95% confidence limits 1035-2582) mg/kg.
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance	:	Commercial samples - ex Rohm & Haas Co
12.05.1997		(33)
Type	:	LD50
Value	:	1000 - 5000 mg/kg bw
Species	:	rat
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	other
Year	:	1979
GLP	:	no data
Test substance	:	other TS
Remark	:	Male and female rats
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance	:	Nonyl phenol technical grade - ex ICI plant
12.05.1997		(34)
Type	:	LD50
Value	:	= 580 mg/kg bw
Species	:	rat

Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	other: no data
Year	:	
GLP	:	no data
Test substance	:	no data

Source : Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
12.05.1997 (39)

Type	:	other: Evaluation Statemenmt
Value	:	
Species	:	
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	

Remark : Several acute oral toxicity test have been done in rats.
LD50 values were consistently reported to be in a range between 1000 and 2000 mg/kg bw, with one exception, where a value of 580 mg/kg bw was reported.

Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
12.05.1997

5.1.2 ACUTE INHALATION TOXICITY

Type	:	other: Asessment of sensory irritation potential
Value	:	
Species	:	mouse
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Exposure time	:	
Method	:	other
Year	:	1995
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4

Remark : Nonyl phenol was assessed in a sensory irritation screen using female mice.

Groups of five mice were exposed, nose only, to atmospheres containing the test substance at the saturated vapour (group 1) or one tenth saturated vapour (group 2) concentrations. Atmospheres were generated at 70 deg C. Analyses were done for atmosheric conditions and the presence of aerosols / particulates and mean particulate size.

The respiration rate of the mice was measured for each target concentration using plethysmography.

The nominal concentrations were 3636 (saturated vapour) and 267 mg/m3 (30 and 400ppm). Only 1% of the test atmosphere contained particulates therefore the majority of test sample was in the vapour phase.

At the top dose a mean respiratory rate depression of 25% was observed. AT 267 mg/m3 theere was no significant depression. The top dose clearly indicates a senssory irritant response. Following removal from exposure, animals showed a rapid recovery and in general, the respiritory rates had returned to control values within five minutes post exposure.

The resuts indicated that nonyl phenol was mildley iritant to the respiratory tract. Due to the lack of an effect at the lower dose it was not possible to calculate an RD 50.

Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

12.05.1997 (4)

Type :
Value :
Species :
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Exposure time :

Remark : Acute studies have not been done to determine an LD50. However, assessment of sensory irritation in mice indicates that it is mildly irritant at concentrations of 400ppm.

Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

12.05.1997

5.1.3 ACUTE DERMAL TOXICITY

Type : LD50
Value : = 2031 mg/kg bw
Species : rabbit
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other: one day cuff method of Draize and associates
Year : 1944
GLP : no
Test substance : no data

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire

Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
31.01.1994 (37)

Type : LD50
Value : > 2000 mg/kg bw
Species : rabbit
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method : other: no data
Year :
GLP : no data
Test substance : no data

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
10.02.1994 (36)

Type : other: Evaluation Statement
Value :
Species :
Strain :
Sex :
Number of animals :
Vehicle :
Doses :

Remark : The dermal toxicity has been studied in two seperate tests in rabbbits. Although neither test was conducted according to current guidelines, both showed that the dermal LD50 for nonylphenol was higher than 2000 mg/kg bw .
Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
12.05.1997

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

5.2.2 EYE IRRITATION

5.3 SENSITIZATION

5.4 REPEATED DOSE TOXICITY

Type : Sub-chronic
Species : rat

Sex	:	male/female
Strain	:	other: Sprague-Dawley Crl:CD BR
Route of admin.	:	oral feed
Exposure period	:	90 days
Frequency of treatm.	:	daily
Post exposure period	:	recovery group of control and high dose group animals for 4 weeks
Doses	:	200, 650, or 2000 ppm
Control group	:	yes, concurrent no treatment
NOAEL	:	= 650 ppm
Method	:	EPA OPPTS 870.3100
Year	:	1997
GLP	:	yes
Test substance	:	other TS: para-Nonylphenol

Method :

NP was administered to four groups of rats at dietary concentrations of 0, 200, 650, or 2000 ppm which corresponded to approximate dietary intakes of 0, 15, 50, or 150 mg/kg/day, respectively. There were 25 rats/sex/ group in the control and high dose groups and 15 rats/ sex/group in the low and middose groups. Ten of the 25 rats/sex in the control and high-dose groups were designated as recovery animals and were maintained on control diets for 4 weeks after completion of the 90-day exposure period to assess the reversibility of any effects which might be observed. At the start of dosing (approximately 6 weeks of age), body weights ranged from 182 to 233 g for males and 146 to 183 g for females. During the study, animals were observed once daily for sings of toxicity. Body weights and food consumption were measured weekly. Ophthalmic exams were performed on each animal before initiation of dosing and prior to termination. Blood samples for clinical pathology studies were collected from all animals (fasted) at termination via puncture of the orbital plexus. The following hematology parameters were evaluated for all rats: erythrocyte count, hematocrit, hemoglobin, mean cell hemoglobin, mean cell hemoglobin concentration, mean cell volume, leukocyte count, platelet count, activated partial thromoboplastin time, and prothrombin time. A differential leukocyte count and cell morphology were determined for the control and 2000-ppm groups. The following serum chemistry parameters were evaluated for all rats: glucose, urea nitrogen, creatinine, total protein, albumin, globulin, albumin/globulin ratio, total cholesterol, total bilirubin, alkaline phosphatase, lactate dehydrogenase, Alanine aminotransferase, gamma-glutamyltransferase, aspartate aminotransferase, creatine kinase, calcium, inorganic phosphorus, sodium, potassium, and chloride. To evaluate for the possible weak estrogen-like activity that has been reported for NP in a number of screening assays, estrous cyclicity was monitored using vaginal cytology during week 8 of the study, and sperm count, motility, and morphology were evaluated at termination. Vaginal smears were obtained for all females for 7 consecutive days during Week 8. Complete necropsies were performed on all animals. The following organs were weighed: adrenals, brain with stem, heart, kidneys, liver, ovaries, pituitary, prostate, mandibular salivary glands, seminal vesicles, spleen, testes and epididymides (together and separately), thyroid with parathyroids, and uterus. The following organs and tissues were preserved in 10% neutral buffered formalin: adrena1s, aorta (thoracic), bone (femur, including articular surface), bone marrow (sternum), brain with stem, colon, cecum,

rectum, duodenum, jejunum, ileum, esophagus, exorbital lacrimal glands, eyes (with optic nerve), heart, kidneys, larynx, lesions, liver, lungs (with mainstem bronchi), mammary gland (females), mandibular lymph node, mesenteric lymph node, nasopharyngeal tissues, ovaries, pancreas, pituitary, prostate, mandibular salivary gland, seminal vesicles, sciatic nerve, gastrocnemius skeletal muscle, skin, spinal cord (cervical, midthoracic and lumbar), spleen, stomach, thymus, thyroid (parathyroids), trachea, urinary bladder, uterus with cervix and vagina, Zymbal's gland, left testis, epididymis, and vas deferens of the Week 14 necropsy males, and left and right testis, epididymis, and vas deferens of the 4-week recovery sacrifice males. All preserved tissues were embedded, stained and evaluated microscopically from all control and high-dose animals killed at 14 weeks. Lung, liver, heart, kidney, and gross lesions were examined from all animals in the 200- and 650-ppm groups. Kidneys were examined from males in the 4-week recovery groups.

Statistical analysis: Body weight, weight change, food consumption, food efficiency, clinical pathology data, and organ weight data were analyzed statistically using one-way analysis of variance (ANOVA) techniques. Values were tested for homogeneity of variance. When variances were heterogeneous, a rank transformation of data was performed to achieve variance homogeneity. If the transformation did not achieve homogeneity, analyses were still performed on the rank-transformed data. Group comparisons were performed by Dunnett's t test at the two-tailed 5.0% probability level. Sperm assessment data were compared using the Kruskal-Wallis nonparametric ANOVA test. The Wilcoxon (Mann-Whitney U) test was used for pair-wise comparisons of each treated group to the control group.

Result : In-life effects from NP exposure were limited to small decreases in body weight and food consumption in the 2000-ppm dose group. Postmortem measurements at Week 14 indicated a dose-related kidney weight increase in males and a decrease in renal hyaline globules/droplets in males from the high-dose group. The kidney weights showed complete recovery following the 4-week postdosing recovery period. Due to the small magnitude of the changes (i.e., all weights were within or near laboratory historical control values) and the lack of correlating clinical or histopathological changes, the kidney weight alterations were not considered toxicologically significant. The biological significance of reduced hyaline in the kidneys of male rats from the high-dose group is uncertain. Renal tubular hyaline is associated with the rat-specific protein, alpha-2u-globulin, and, therefore, this finding was not considered toxicologically relevant to humans. No other effects attributable to NP were observed. No changes were observed for estrous cycling, sperm evaluations, or effects on endocrine organs. NP, therefore, did not manifest any estrogen-like activity as measured in these parameters at dietary concentrations as high as 2000 ppm, the maximum dose administered in this study.

Test substance : para-Nonylphenol, CAS No. 84852-15-3, purity 95.6%

Conclusion : Based on the minor findings for the 2000 ppm dose group, the NOAEL (no-observed- adverse-effect level) for NP in this study is considered to be 650 ppm in the diet, corresponding to an approximate intake of 50 mg/kg/day.

Reliability	:	(1) valid without restriction Guideline study
Flag	:	Critical study for SIDS endpoint

14.03.2006 (9)

Type	:	
Species	:	rat
Sex	:	male/female
Strain	:	other: Crl:CD(SD)BR
Route of admin.	:	oral feed
Exposure period	:	28 days
Frequency of treatm.	:	daily
Post exposure period	:	none
Doses	:	25, 100 und 400 mg/kg bw d
Control group	:	yes
NOAEL	:	= 100 mg/kg bw
Method	:	OECD Guide-line 407 "Repeated Dose Oral Toxicity - Rodent: 28-day or 14-d Study"
Year	:	1981
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	Four groups of ten (five males, five females) rats were offered a diet containing Nonylphenol (purity >= 98 %) at nominal dose levels of 0, 25, 100 and 400 mg/kg/day (groups 1, 2, 3 and 4 respectivley).
Result	:	There were no mortalities an no clinical signs to suggest any effect of treatment. Group 4 animals gained significantly less weight than the controls. At week 4, group mean body weights were less than those of the controls by 26% and 13% for males and females respectiveley. Group 4 animals, males in particular, consumed less food than the controls. There was no effect in groups 2 and 3. At week 4 several blood chemistry values of group 4 males differed from control group animals (decrease of mean glucose level, increase of mean urea and cholesterol level). There were increases in group 4 mean relative kidney, liver and testes weights. Histopathology findings showed a hyaline droplet accumulation in the renal proximal tubules, and a minor vacuolation in the periportal hepatocytes in the liver in group 4 males. No such treatment related effects were observed in females. Groups 2 and 3 males showed several differences compared to control group (increase of absolute and relative kidney and liver weight,increase of relative adrenal weight). As means and individual values were within the physiological range of the used strain, these observations are not considered to be related to treatment. In females, no differences between controls and group 2 and 3 were observed. For both males and females the no observable effect level is considered to be 100 mg/kg/day.
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

10.02.1994 (29)

Type	:	Sub-chronic
Species	:	rat
Sex	:	male/female

Strain	:	other: CD (R)
Route of admin.	:	oral feed
Exposure period	:	see methods
Frequency of treatm.	:	daily
Post exposure period	:	see methods
Doses	:	see methods
Control group	:	other: yes, concurrent, no treatment and positive control E2 (17 beta-estradiol)
NOAEL	:	= 200 ppm
Method	:	other
Year	:	
GLP	:	no data
Test substance	:	other TS

Method : The present study used NP in Purina 5002 at 0, 20, 200, 650, and 2000 ppm, NP in NIH-07 at 0 and 650 ppm, and 17 beta-estradiol (E2; reference compound) at 2.5 ppm in Purina 5002. The comparison of the Purina 5002 and the NIH-07 was made to determine if dietary differences could account for differences in dose response observed for NP male kidney toxicity in previous studies. The F0 parental animals began exposure at seven weeks of age and were exposed to their respective diets (25/sex/dose group) ad libitum for a ten-week prebreed, two-week mating, three-week gestation, and three-week lactation. Selected Fl and F2 offspring at weaning (one/sex/litter) were directly exposed to their parents' diet for prebreed, mating, gestation, and lactation. F3 weanlings (males only, one/litter) were directly exposed to their parents' diets to adulthood until postnatal day (pnd) ll0 +/- 10. Body and feed weights were documented periodically throughout the study. Gross and histopathological evaluations were performed on kidneys from F0, F1 and F2 adult males.

Remark : The study was performed to evaluate the potential of para-nonylphenol (NP; CAS RN 84852-15-3), administered in the feed to CD rats, to produce alterations in adult male kidneys, parental fertility, and growth and development of the offspring for three generations, one litter per mating per generation. This study focused on specific endpoints to confirm and extend the findings of kidney toxicity reported by Cunny et al. (1997) in adult rats exposed to NP in Purina 5002 feed at 2000 ppm for 90 days and Chapin et al. (1999) at 200, 650, and 2000 ppm NP in NIH-07 feed in a multigeneration study. The specific endpoints of concern were effects on the kidney, epididymal sperm numbers, and uterine implantation sites.

Result : · Adult systemic toxicity (relatively consistent reduced body weights, male weight gains, and feed consumption) was present in parental males and females and offspring at 2000 ppm NP in Purina 5002 and in parental females at 650 ppm NP in NIH-07, confirming effects observed by Cunny et al. and Chapin et al.

· Adult male renal pathology was observed at 650 and 2000 ppm NP in Purina 5002 and at 650 ppm NP in NIH-07, that included: (1) increased kidney weight (F0, Fl, F2); (2) increased incidence of mineralization at the corticomedullary junction at 650 ppm NP in Purina 5002 and NIH-07, and at 2000 ppm NP (F0, Fl, F2 adult males); and (3) increased incidence of medullary cysts at 2000 ppm NP (Fl, F2 adult males), and no change in the incidence or severity of nephropathy, per se, in any generation at any dietary NP

dose. This confirms the renal toxicity in adult males at 2000 ppm NP by Cunny et at. (1997) but extends the renal mineralization findings to 650 ppm not seen in the 90-day study. In addition, these findings are consistent with the effects observed for the F0, F1, and F2 adult males and females in the Chapin et at. {1999) study, but did not confirm the effects at doses lower than 650 ppm (minimal effects were recorded at 200 ppm in the Chapin et al. study).

· For adult males, there were no effects on absolute and relative testes or epididymal weights.

· Absolute and relative paired ovarian weights were reduced at 2000 ppm NP for FO, F1, and F2 females; at 650 ppm in Purina 5002 for F1 females; and at 650 ppm NP in NIH-07 for FO and F2 females. This effect on ovarian weights is consistent with the findings of Chapin et al. at 650 and 2000 ppm NP.

· Offspring toxicity was expressed as reduced pup body weight per litter for all Fl and F2 (but not F3) pups at 2000 ppm NP at pnd 21. This body weight effect was considered to be related to direct NP toxicity for the last lactational week from overexposure due to self-feeding of the experimental diets (the pups eat much more feed/day relative to their body weights than the adults), as well as possible translactational exposure.

· For the 2.5 ppm E2 positive control group, the overall pattern and extent of effects observed at 2.5 ppm E2 were consistent with and predicted by the results reported by Biegel et al. (1998a,b) that were used to select the dose used in the present study. The following were observed:
1. Renal toxicity (specifically mineralization at the corticomedullary junction) was increased in F0, F1 and F2 males; nephropathy was decreased in F0, F1, and F2 males.

Test substance : nonylphenol, 4-nonylphenol; CAS No. 84852-15-3; purity 94.25%

Conclusion : 1. The NOAEL for kidney toxicity in male rats was 200 ppm NP.

2. Kidney effects were observed for E2, although the mechanism for these effects is unclear.

3. This study confirmed the systemic toxicity observed in previous studies at the highest dietary NP concentration (2000 ppm). Overall, this study demonstrates a lack of transgenerational effects. It also provides a NOAEL for male kidney toxicity of 200 ppm NP in the diet.

Reliability : (2) valid with restrictions
07.09.2006 (42)

5.5 GENETIC TOXICITY 'IN VITRO'

Type : HGPRT assay
System of testing : V 79 of the Chinese hamster
Test concentration : 0.00016 - 0.01 mg/ml without S9-mix; 0.0004 - 0.1 mg/ml with S9 mix
Cycotoxic concentr. :
Metabolic activation : with and without

Result	:	negative
Method	:	OECD Guide-line 476
Year	:	1984
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	The result indicates, that Nonylphenol has no reproducible biologically significant effect on the mutation frequency in the HPRT-locus.
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

01.02.1994 (28)

Type	:	Ames test
System of testing	:	Salmonella typhimurium TA 98, TA 100, TA 1535, TA 1537, TA 1538
Test concentration	:	up to 5 mg/plate
Cycotoxic concentr.	:	
Metabolic activation	:	with and without
Result	:	negative
Method	:	other: see remark
Year	:	
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	Test was performed according methodology described in: Ames, B.N.; J.Mc. Cann, E. Yamashi: Mutation Research, 31, 347-364, (1975)
Source	:	Huels AG Marl Huels AG Marl 1 ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

01.02.1994 (31)

Type	:	other: Evaluation Statement
System of testing	:	
Test concentration	:	
Cycotoxic concentr.	:	
Metabolic activation	:	
Result	:	
Method	:	
Year	:	
GLP	:	
Test substance	:	
Remark	:	Nonylphenol was tested in a bacterial and a mammalian mutagenicity assay. Both assays gave negative ie. non mutagenic responses.
Source	:	ICI Chemicals & Polymers Limited Runcorn, Cheshire Huels AG Marl EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

12.05.1997

5.6 GENETIC TOXICITY 'IN VIVO'

Type	:	Micronucleus assay
Species	:	mouse

Sex	:	male/female
Strain	:	NMRI
Route of admin.	:	gavage
Exposure period	:	18, 48 and 72 hours
Doses	:	500 mg/kg bw d
Result	:	
Method	:	other: Directive 79/831/EEC, B.12
Year	:	1979
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4

Result : Nonylphenol was administered once at 10 mice (5 males, 5 females) on a dose level of 500 mg/kg (maximum tolerated dose). No mutagenic effects in mice erythrocytes were observed at 18, 48 and 72 hours sampling time.

Source : Huels AG Marl
Huels AG Marl 1
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

07.02.1994 (27)

Type	:	other: Evaluation Statement
Species	:	
Sex	:	
Strain	:	
Route of admin.	:	
Exposure period	:	
Doses	:	
Result	:	
Method	:	
Year	:	
GLP	:	
Test substance	:	

Remark : Nonylphenol did not show genotoxic activity in a micronucleus assay conducted in the mouse.

Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

12.05.1997

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

Type	:	other: 3 generation study
Species	:	rat
Sex	:	male/female
Strain	:	other: CD
Route of admin.	:	oral feed
Exposure period	:	see methods
Frequency of treatm.	:	daily
Premating exposure period		
Male	:	see methods
Female	:	see methods
Duration of test	:	see methods

No. of generation studies	:	3
Doses	:	see methods
Control group	:	other: yes, concurrent no treatment and positive control (E2)
NOAEL parental	:	= 2000 ppm
NOAEL F1 offspring	:	= 2000 ppm
NOAEL F2 offspring	:	= 2000 ppm
Result	:	Study demonstrates a lack of transgenerational effects and confirms that NP is not a selective reproductive toxicant
Method	:	other
Year	:	
GLP	:	no data
Test substance	:	other TS

Method : The present study used NP in Purina 5002 at 0, 20, 200, 650, and 2000 ppm, NP in NIH-07 at 0 and 650 ppm, and 17 beta-estradiol (E2; reference compound) at 2.5 ppm in Purina 5002. The comparison of the Purina 5002 and the NIH-07 was made to determine if dietary differences could account for differences in dose response observed for NP male kidney toxicity in previous studies. The F0 parental animals began exposure at seven weeks of age and were exposed to their respective diets (25/sex/dose group) ad libitum for a ten-week prebreed, two-week mating, three-week gestation, and three-week lactation. Selected Fl and F2 offspring at weaning (one/sex/litter) were directly exposed to their parents' diet for prebreed, mating, gestation, and lactation. F3 weanlings (males only, one/litter) were directly exposed to their parents' diets to adulthood until postnatal day (pnd) ll0 +/- 10. Body and feed weights were documented periodically throughout the study. F0, F1, and F2 parental mating performance and gestational and lactational data were recorded. F1, F2, and F3 offspring lactational and postwean data were also collected. For the 0 and 2.5 ppm E2 groups in Purina 5002, anogenital distance was measured at birth (pnd 0), and acquisition of puberty (vaginal patency for females, preputial separation for males) was recorded for F1 offspring only. Andrological assessments were performed on adult F0, F1, F2, and F3 males.

Remark : The study was performed to evaluate the potential of para-nonylphenol (NP; CAS RN 84852-15-3), administered in the feed to CD rats, to produce alterations in adult male kidneys, parental fertility, and growth and development of the offspring for three generations, one litter per mating per generation. This study focused on specific endpoints to confirm and extend the findings of kidney toxicity reported by Cunny et al. (1997) in adult rats exposed to NP in Purina 5002 feed at 2000 ppm for 90 days and Chapin et al. (1999) at 200, 650, and 2000 ppm NP in NIH-07 feed in a multigeneration study. This study was also designed to evaluate potential transgenerational effects suggested by equivocal findings in sperm counts observed only in the F2 offspring exposed to NP at 650 and 2000 ppm. The specific endpoints of concern were effects on the kidney, epididymal sperm numbers, and uterine implantation sites.

Result : · Adult systemic toxicity (relatively consistent reduced body weights, male weight gains, and feed consumption) was present in parental males and females and offspring at 2000 ppm NP in Purina 5002 and in parental females at 650 ppm NP in NIH-07, confirming effects observed by Cunny et al. and Chapin et al.

· For adult males, there were no effects on absolute and relative testes or epididymal weights, no effects on cauda epididymal percent motile sperm, percent progressively motile sperm, percent abnormal sperm, or epididymal sperm concentrations. Testicular homogenization-resistant spermatid head counts were also unaffected, as were daily sperm production (DSP) and efficiency of DSP.

· Absolute and relative paired ovarian weights were reduced at 2000 ppm NP for FO, F1, and F2 females; at 650 ppm in Purina 5002 for F1 females; and at 650 ppm NP in NIH-07 for FO and F2 females. This effect on ovarian weights is consistent with the findings of Chapin et al. at 650 and 2000 ppm NP.

· For the 2.5 ppm E2 positive control group, the overall pattern and extent of effects observed at 2.5 ppm E2 were consistent with and predicted by the results reported by Biegel et al. (1998a,b) that were used to select the dose used in the present study. The following were observed:
1. Reduced fertility, and gestational and pregnancy indices.
2. Reduced epididymal sperm concentrations in adult F1, F2, and F3 offspring males.
3. Reduced absolute and relative ovarian weights in F0, F1 and F2 adult females.
4. Reduced numbers of F1, F2, and F3 litters and reduced numbers of live pups/litter.

Test substance : nonylphenol, 4-nonylphenol; CAS No. 84852-15-3; purity 94.25%

Conclusion : 1. There were no treatment-related effects on sperm parameters in any generation.
2. There were no consistent or persistent treatment-related effects on F1, F2 or F3 litters from NP exposure on the number of implantation sites per litter, postimplantation loss per litter, litter size, stillbirth or live birth indices, or lactational survival indices.
3. Decreased ovarian weight was confirmed in the 2000 ppm NP group across all generations and, less consistently, at 650 ppm. This effect on ovarian weight did not affect reproductive capacity.
4. The results in the 2.5 ppm E2 positive control group confirmed the susceptibility of the animal model to authentic estrogens and the competence of the laboratory to detect systemic, reproductive, and developmental effects in adult and offspring rats.
5. Key effects observed for E2 at 2.5 ppm in the diet, that were not observed for NP at any dietary concentration, included reduced epididymal sperm count and reduced fertility. Ovarian weight changes of similar magnitude were observed in the 2.5 ppm E2 and 2000 ppm NP groups. The mechanism for the reduced ovarian weight for either chemical is unknown. The relationship of the change to fertility in the E2 group is uncertain, since no similar response was seen in the NP group.
6. This study confirmed the systemic toxicity observed in previous studies at the highest dietary NP concentration (2000 ppm). There were no statistically significant effects from NP on reproductive parameters or sperm counts in any generation. Overall, this study demonstrates a lack of transgenerational effects and confirms that NP is not a selective reproductive toxicant. It also provides a NOAEL

for male kidney toxicity of 200 ppm NP in the diet.

Reliability : (2) valid with restrictions
07.09.2006 (42)

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

Species	:	rat
Sex	:	female
Strain	:	Wistar
Route of admin.	:	gavage
Exposure period	:	6-15 day of gestation
Frequency of treatm.	:	daily
Duration of test	:	20 days
Doses	:	75, 150 and 300 mg/kg bw
Control group	:	yes
NOAEL maternal tox.	:	75 mg/kg bw
NOAEL teratogen.	:	300 - mg/kg bw
Method	:	Directive 87/302/EEC, part B, p. 24 "Teratogenicity test - rodent and non-rodent"
Year	:	1981
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4

Result : Treatment of pregnant females from day 6 to day 15 of gestation at a dose level of 75 mg/kg was without any general toxicological effect. At a dose level of 150 mg/kg only 3 of 21 females showed affected kidneys or spleens. However, the dose level of 300 mg/kg caused clear maternal toxic effects like increased mortality, reduced body weightgain and food consumption. Caesarean section were carried out on day 20 of gestation. The findings did not disclose any biologically significant differences between groups in the mean number and presentation of fetuses, the left and right intrauterine distribution, the sex ratio, fetal and placental weights, the number of runts and dead fetuses, resorptions, implantations and corpora lutea as well a in the pre- and post implantation loss and resorption indices. Fetal examination did not disclose any treatment related malformations or abnormalities. With regard to the embryo-fetal development a no observable adverse effect level of 300 mg/kg was found.

Source : Huels AG Marl
ICI Chemicals & Polymers Limited Runcorn, Cheshire
Huels AG Marl
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
14.03.2006 (32)

Species	:	rat
Sex	:	male/female
Strain	:	other: CD
Route of admin.	:	oral feed
Exposure period	:	see methods
Frequency of treatm.	:	daily
Duration of test	:	see methods
Doses	:	see methods
Control group	:	other: yes, concurrent no treatment and positive control (E2)
Method	:	other
Year	:	
GLP	:	no data
Test substance	:	other TS

Method : The present study used NP in Purina 5002 at 0, 20, 200, 650, and 2000 ppm, NP in NIH-07 at 0 and 650 ppm, and 17 beta-estradiol (E2; reference compound) at 2.5 ppm in Purina 5002. The comparison of the Purina 5002 and the NIH-07 was made to determine if dietary differences could account for differences in dose response observed for NP male kidney toxicity in previous studies. The F0 parental animals began exposure at seven weeks of age and were exposed to their respective diets (25/sex/dose group) ad libitum for a ten-week prebreed, two-week mating, three-week gestation, and three-week lactation. Selected Fl and F2 offspring at weaning (one/sex/litter) were directly exposed to their parents' diet for prebreed, mating, gestation, and lactation. F3 weanlings (males only, one/litter) were directly exposed to their parents' diets to adulthood until postnatal day (pnd) ll0 +/- 10. Body and feed weights were documented periodically throughout the study. F0, F1, and F2 parental mating performance and gestational and lactational data were recorded. F1, F2, and F3 offspring lactational and postwean data were also collected. For the 0 and 2.5 ppm E2 groups in Purina 5002, anogenital distance was measured at birth (pnd 0), and acquisition of puberty (vaginal patency for females, preputial separation for males) was recorded for F1 offspring only. Andrological assessments were performed on adult F0, F1, F2, and F3 males. Gross and histopathological evaluations were performed on kidneys from F0, F1 and F2 adult males.

Remark : The study was performed to evaluate the potential of para-nonylphenol (NP; CAS RN 84852-15-3), administered in the feed to CD rats, to produce alterations in adult male kidneys, parental fertility, and growth and development of the offspring for three generations, one litter per mating per generation. This study focused on specific endpoints to confirm and extend the findings of kidney toxicity reported by Cunny et al. (1997) in adult rats exposed to NP in Purina 5002 feed at 2000 ppm for 90 days and Chapin et al. (1999) at 200, 650, and 2000 ppm NP in NIH-07 feed in a multigeneration study. This study was also designed to evaluate potential transgenerational effects suggested by equivocal findings in sperm counts observed only in the F2 offspring exposed to NP at 650 and 2000 ppm. The specific endpoints of concern were effects on the kidney, epididymal sperm numbers, and uterine implantation sites.

Result : · Offspring toxicity was expressed as reduced pup body weight per litter for all Fl and F2 (but not F3) pups at 2000 ppm NP at pnd 21. This body weight effect was considered to be related to direct NP toxicity for the last lactational week from overexposure due to self-feeding of the experimental diets (the pups eat much more feed/day relative to their body weights than the adults), as well as possible translactational exposure.

· For the 2.5 ppm E2 positive control group, the overall pattern and extent of effects observed at 2.5 ppm E2 were consistent with and predicted by the results reported by Biegel et al. (1998a,b) that were used to select the dose used in the present study. The following were observed:

1. Reduced numbers of total and live pups/litter on pnd 0.
2. Reduced numbers of F1, F2, and F3 litters and reduced numbers of live pups/litter.
3. Anogenital distance at birth was unaffected in both male

and female offspring, acquisition of puberty was significantly accelerated in female offspring (vaginal patency) and significantly delayed in male offspring (preputial separation).

Test substance : nonylphenol, 4-nonylphenol; CAS No. 84852-15-3; purity 94.25%

Conclusion : 1. There were no consistent or persistent treatment-related effects on F1, F2 or F3 litters from NP exposure on the number of implantation sites per litter, postimplantation loss per litter, litter size, stillbirth or live birth indices, lactational survival indices, or on pup body weights per litter (total pups or sexes separately) on pnd 0 or 4. On pnd 21, pup body weights per litter (total or separately by sex) were reduced for F1 and F2 litters (but not F3) at 2000 ppm NP. For the F1, F2, and F3 males necropsied at weaning, all three generations exhibited reduced body weights at 2000 ppm NP.
2. The results in the 2.5 ppm E2 positive control group confirmed the susceptibility of the animal model to authentic estrogens and the competence of the laboratory to detect systemic, reproductive, and developmental effects in adult and offspring rats.
3. This study confirmed the systemic toxicity observed in previous studies at the highest dietary NP concentration (2000 ppm). There were no statistically significant effects from NP on reproductive parameters or sperm counts in any generation. Overall, this study demonstrates a lack of transgenerational effects and confirms that NP is not a selective reproductive toxicant. It also provides a NOAEL for male kidney toxicity of 200 ppm NP in the diet.

Reliability : (2) valid with restrictions
07.09.2006 (42)

5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

5.11 ADDITIONAL REMARKS

6.1 ANALYTICAL METHODS

6.2 DETECTION AND IDENTIFICATION

7.1 FUNCTION

7.2 EFFECTS ON ORGANISMS TO BE CONTROLLED

7.3 ORGANISMS TO BE PROTECTED

7.4 USER

7.5 RESISTANCE

8.1 METHODS HANDLING AND STORING

8.2 FIRE GUIDANCE

8.3 EMERGENCY MEASURES

8.4 POSSIB. OF RENDERING SUBST. HARMLESS

8.5 WASTE MANAGEMENT

8.6 SIDE-EFFECTS DETECTION

8.7 SUBSTANCE REGISTERED AS DANGEROUS FOR GROUND WATER

8.8 REACTIVITY TOWARDS CONTAINER MATERIAL

(1) Alkylphenol & Ethoxylates Panel (1990)
Five Physical / Chemical 4-Nonylphenol final reports.
1. Boiling Point, 2. Crystallization Point, Instead of Melting Point, 3. Dissociation Constant, 4. Water solubility, 5. Vapor Pressure
Chemical Manufacturers Association,
Washington DC, 20037
August 21, 1990

(2) Atkinson, R.: A structure-activity relationship for the estimation of rate constants for the gas-phase reactions of OH radicals with organic compounds. Int J. Chem. Kinet. 19, 799-828 (1987)

(3) Berol Kemi AB, S-444 85 Stenungsund: Nonylphenol - Acute Toxicity in Rats. IRI Project No. 230086, IRI Scotland, 1982 (unpublished).

(4) Central Toxicology Laboratory (1995)
Nonylphenol: Assessment of Sensory Irritation potential in mice
Report number: CTL/L/6768
Date : 31 August 1996
Study Sponsor: ICI Chemicals & Polymers Limited

(5) Chemical Manufacturers Association (1990)
Four environmental effects 4-Nonylphenol final reports
1. Acute Flow through toxicty of Nonylphenol to the Sheepshead minnow, Cyprinodon variegatus: EnviroSystems Study Number 8972-CMA
2. Acute Flow through toxicty of Nonylphenol to the Mysid, mysidopsis bahia: EnviroSystems Study Number 8974-CMA
3. Acute Static Toxicty of Nonylphenol to the freshwater Alga, Selenastrum capricornutum: EnviroSystems Study Number 8969-CMA
4. Acute Static Toxicty of Nonylphenol to the Marine Alga, Skeletonema costatum: EnviroSystems Study Number 8970-CMA
Testing Laboratory Resource Analysts Inc. EnviroSystems Division, Hamton,New Hampshire
Test Sponsor: Chemical Manufacturers Association, Washington DC. November 21 1991

(6) Chemical Manufacturers Association (1991)
Determination of the Octanol/ Water Partition coefficient of 4-Nonylphenol
Testing Laboratory: RF Weston Inc. Lionville, PA. Study No. 90-046
Test Sponsor: Chemical Manufacturers Association, Washington DC. December 1991

(7) Chemical Manufacturers Association (1991)
Determination of the solubility of 4-nonylphenol in seawater.
Testing Laboratory: RF Weston Inc. Lionville, PA.
Study number 90-144
Sponsor: Chemical Manufacturers Association, Washington DC, 20037 Febuary, 1991

(8) Chemical Manufacturers Association (1994) Toxicity of Nonylphenol to the Amiphipod Hyalella azteca (Saussure) Testing Laboratory: ABC Laboratories, Inc. Columbia, MO Test Sponsor: Chemical Manufacturers Association, Washington DC. Draft report #41569 December, 1994

(9) Cunny, H.C., B.A. Mayes, K.A. Rosica, J.A. Trutter, and J.P. VanMiller (1997) Subchronic Toxicity (90-Day) Study with para-Nonylphenol in Rats. Reg. Toxicol. Pharmacol. 26:172-178

(10) Dutch Institute for the Working Environment/Dutch Chemical Industry Association: Chemical Safety Sheets 1991, P. 655. Kluwer Academic Publishers / Samsom Chemical Publishers

(11) EPIWIN version 3.11

(12) Ernst, B., Julien, G., Doe, K. and Parker, R. (1980); Environmental investigations of the 1980 spruce budworm spray program in New Brunswick. EPS-5-AR-81-3, Surveillance Report, Canada EPS

(13) European Union Risk Assessment Report (2001) 4-Nonylphenol (branched) and nonylphenol. Final Report, April 2001. United Kingdom.

(14) Gaworski, C.L. et al. (1979); "Acute toxicity of a number of chemicals of interest to the Air Force"; University of California Extension, Wright Patterson Air Force Base; Report ISS AMRL-TR-79-11 (AD-A067313).

(15) Hoechst AG, Report No. 103/69, 1969 (unpublished), cited after BUA-Report No. 13, Nonylphenol, VCH, 1988

(16) Holcombe, G.W., Phipps, G.L., Knuth, M.L. and Felhaber, T. (1984); Environ. Pollut. (Series A) 35, 367-381

(17) Huels AG, Sicherheitsdatenblatt "Nonylphenol" vom 21.02.94

(18) Huels AG: Produktinformation Alkylphenol / Nonylphenol, Art. Nr. 001591 (1994)

(19) Huels AG: Report No. BO-90/3, 1990 (unpublished)

(20) Huels AG: Report on water solubility of "Nonylphenol 95", sample no. 2112/04735, 1994 (unpublished)

(21) Huels AG: Unpublished study (1988)

(22) Huels report No. 153611931, 1988 (unpublished)

(23) Huels report No. DK-522, 1992 (unpublished)

(24) Huels study (unpublished)

(25) Huels study, 1988 (unpublished)

(26) Huels study, 1989 (unpublished)

(27) Huels-Report "Mutagenitaetsuntersuchung von Nonylphenol im Mikrokern-Test", P. Schoeberl, 1988, (unpublished)

(28) Huels-Report 688, Final Report: in vitro mammalian cell gene mutation test with nonylphenol, IBR-Project No. 95-86-0449-90, 1990 (unpublished)

(29) Huels-Report 774: Nonylphenol: A 28 day oral (dietary) subacute toxicity study in the rat, prepared by Hazleton UK, Report-No. 5917-671/1 (unpublished)

(30) Huels-Report No. 0583, 1986 (unpublished)

(31) Huels-Report No. 84/19, Projekt X 41, 1984, (unpublished)

(32) IBR Forschungs GmbH, D-3030 Waldsrode; IBR-Project-No.: 20-04-0502/00-91 (1992)
Sponsor: INITIATIVE UMWELTRELEVANTE ALTSTOFFE e.V. Kennedyalle 93, W-6000 Frankfurt 70

(33) ICI PLC (1984)
Nonyly Phenol (Ex Oil works and Rohm and Haas): Comparison of acute oral toxicities.
Report No: CTL/L/708

(34) Imperial Chemicals Industries Limited (1979)
Nonyl Phenol (ex Oil Works and Rohm & Hass) - Comparison of acute oral toxicities, skin and eye irritation and skin sensitisation potential.
Report No: CTL/T/1278

(35) Imperial Chemicals Industries Limited (1979)
Nonyl Phenol (ex Oil Works and Rohm & Hass) - Comparisson of acute oral toxicities, skin and eye irritation and skin sensitisation potential.
Report No: CTL/T/1278

(36) Monsanto 1985. Monsanto Industrial Chemicals Co. FYI-OTS-0685-0402 FLWP, Seq. G. Material Safety Data Sheet. Washington, DC: Office of Toxic Substances, U.S. Environmental Protection Agency

(37) Smyth, H.F. et al. (1969); Am. Ind. Hyg. Assoc. J. 30, 470-476

(38) Taupin, P.J.Y. (1981); "Nonylphenol - An acute oral toxicity study (LD50) in the rat"; Hazleton/Muenster Report 222/8

(39) Texaco (1985)
Texaco Chemical company. FYI-OTS-0685-0402 FLWP, Seq. I. Material Safety Data Sheet. Washington, DC:

(40) Texaco 1985. Texaco Chemical company. FYI-OTS-0685-0402 FLWP, Seq. I. Material Safety Data Sheet. Washington, DC: Office of Toxic Substances, U.S. Environmental Protection Agency

(41) The Merck Index, 10th Edition, p. 957, Merck & Co., Rahway (N.J., USA) 1983

(42) Tyl, R.W., Myers, C.B., Marr, M.C., Castillo, N.P., Seely, J.C., Sloan, C.S., Veselica, M.M., Joiner, R.O., Van Miller, J.P. and G.S. Simon (2006) Three-Generation Evaluation of Dietary para-Nonylphenol in CD (Spraque-Dawley) Rats. Toxicological Sciences 92(1): 295-310.

10.1 END POINT SUMMARY

10.2 HAZARD SUMMARY

10.3 RISK ASSESSMENT

1. General Information

ID 7727-43-7

Date 10 Nov 2005

1.0 SUBSTANCE INFORMATION

201-16427C

Generic Name	:	Barium sulfate
Chemical Name	:	Barium sulfate
CAS Registry No.	:	7727-43-7
Component CAS Nos.	:	
EINECS No.	:	
Structural Formula	:	$BaSO_4$
Additional description	:	Fine, heavy, odorless powder or polymorphous crystals; occurs in nature as the mineral barite
Molecular Weight	:	233.39
Synonyms and Tradenames	:	Barium sulphate; RTECS CR0600000; Radiopaque; Telebar; Microtrast E-Z-Plaque; heavy spar, HSDB 5041, ICSC 0827
References	:	ATSDR, 1992 (Agency for Toxic Substances and Disease Registry, Toxicological Profile for Barium and Compounds, July 1992)
		O'Neil, M.J., Smith, A., Heckelman, P.E., and J.R. Obenchain (eds.). 2002. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Ed. Merck & Co., Inc., Whitehouse Station, NJ. (molecular weight value)

2.1 MELTING POINT

Value	:	= 1580 °C
Decomposition	:	yes
Sublimation	:	
Method	:	other
Year	:	1973
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Remark	:	Data abstracted from Perry and Chilton
Reliability	:	(2) valid with restrictions Source is peer-reviewed published document.
Reference	:	ATSDR, 1992 (Agency for Toxic Substances and Disease Registry, Toxicological Profile for Barium and Compounds, July 1992)

2.2 BOILING POINT

Value	:	= 1149 °C (monoclinic transition point)
Decomposition	:	
Method	:	other
Year	:	1983
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Remark	:	Data abstracted from Parmeggiani
Reliability	:	(2) valid with restrictions Source is peer-reviewed published document.
Reference	:	ATSDR, 1992 (Agency for Toxic Substances and Disease Registry, Toxicological Profile for Barium and Compounds, July 1992)

2.3 DENSITY

Type	:	density
Value	:	= 4.50 g/cm^3
Method	:	other
Year	:	1983
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Reliability	:	(2) valid with restrictions Source is peer-reviewed published document.
Reference	:	ATSDR, 1992 (Agency for Toxic Substances and Disease Registry, Toxicological Profile for Barium and Compounds, July 1992)

2.4 VAPOR PRESSURE

2.5 PARTITION COEFFICIENT

Partition coefficient	:	
Log Pow	:	

pH value	:	
Method	:	other
Year	:	2002
GLP	:	no
Test substance	:	As prescribed by 1.1-1.4
Remark	:	Not applicable because barium sulfate is nearly insoluble in water and alcohol
Reliability	:	(2) valid with restrictions Source is well established data compendium
Reference	:	O'Neil, M.J., Smith, A., Heckelman, P.E., and J.R. Obenchain (eds.). 2002. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Ed. Merck & Co., Inc., Whitehouse Station, NJ. (information on solubility)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	water
Guideline/method	:	
Value	:	at °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
PKa	:	at °C
Description	:	
Stable	:	
Deg. product	:	
Method	:	other
Year	:	2002
GLP	:	no
Test substance	:	As prescribed by 1.1-1.4
Result	:	Practically insoluble in water (one gram dissolves in 400,000 parts)
Reliability	:	(2) valid with restrictions Source is well established data compendium.
Reference	:	O'Neil, M.J., Smith, A., Heckelman, P.E., and J.R. Obenchain (eds.). 2002. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Ed. Merck & Co., Inc., Whitehouse Station, NJ.

2.9 FLAMMABILITY

Result	:	Non flammable
Method	:	other
Year	:	2005
Test substance	:	As prescribed by 1.1-1.4
Reliability	:	(2) valid with restrictions Data taken from a secondary literature source (electronic database)
Reference	:	http://inchem.org/documents/icsc/icsc/eics0827.htm (accessed 11/10/05)

3.1.1 PHOTODEGRADATION

3.1.2 STABILITY IN WATER

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type :
Media :
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Year : 2005
Test substance : As prescribed by 1.1-1.4

Method : EPIWIN
Result : Level III Fugacity Model:

	Mass Amount (percent)	Half-Life (hr)	Emissions (kg/hr)
Air	1.42e-006	1e+005	1000
Water	47.4	900	1000
Soil	52.5	900	1000
Sediment	0.091	3.6e+003	0

Persistence Time: 804 hr

Reliability : (2) valid with restrictions
Data were obtained by modeling.
Reference : EPIWIN (ver 3.11) (2005)

3.3.2 DISTRIBUTION

3.5 BIODEGRADATION

4.1 ACUTE TOXICITY TO FISH

Type :
Species : Molly (*Poecillia latipinna*.)
Exposure period : 96 hours
Unit : ug/L
NOEC :
LC0 : = 59,000,000
LC50 :
LC100 :
Limit test :
Analytical monitoring : No data
Method : other
Year : 1975
GLP : No
Test substance : As prescribed by 1.1-1.4

Result	:	Not acutely toxic to Mollies
Remark	:	This is the only aquatic study found, probably due to the fact that barium sulfate is virtually insoluble in water (data derived from U.S. EPA, AQUIRE database, 2005)
Reliability	:	(2) valid with restrictions Although this is not a Guideline study and few experimental details are present, the results seem credible due to the physical properties of the test material. Data taken from a secondary literature source (electronic database)
Reference	:	U.S. EPA AQUIRE database, 2005 (accessed on 11/10/2005))

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	Flow-through
Species	:	Yellow Rock Crab (*Cancer anthonyi*)
Exposure period	:	7 day
NOEC	:	
EC0	:	
LC50	:	
EC100	:	
Limit test	:	
Analytical monitoring	:	No data
Method	:	other
Year	:	1978
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4

Method	:	Flow-through; hatch and embryo
Result	:	LC50 = 10,000 (hatch) and LC50 = 100,000 µg/L (embryo); Not acutely toxic
Reliability	:	(2) valid with restrictions Although few experimental details were found, the results seem credible based on the lack of water solubility. Data taken from a secondary literature source (electronic database)
Reference	:	U.S. EPA AQUIRE database, 2005 (accessed on 11/10/05 via http://www.pesticideinfo.org/List_AquireAll.jsp?Rec_Id=PC33796&Taxa_Group=Crustaceans)

Type	:	Static
Species	:	Water flea (*Daphnia magna*)
Exposure period	:	48 Hr
Unit	:	ug/L
NOEC	:	
EC0	:	32,000 µg/L (48 Hr)
LC50	:	
EC100	:	
Limit test	:	
Analytical monitoring	:	
Method	:	other
Year	:	1989
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4

Result	:	24-hr EC0 = 52,820 ug/L; Not acutely toxic
Remark	:	Another study resulted in 24 and 48 hour EC50 of 4.64 and 2.81 mg/L,

		respectively (Khangarot and Ray, 1989)
Reliability	:	(2) valid with restrictions Comparable to a Guideline Study
Reference	:	U.S. EPA AQUIRE database, 2005 (accessed on 11/10/05 via http://www.pesticideinfo.org/List_AquireAll.jsp?Rec_Id=PC33796&Taxa_Group=Zooplankton) Khangarot, B.S. and P. K. Ray. (1989) Investigation of Correlation between Physicochemical Properties of Metals and their Toxicity to the Water Flea *Daphnia magna* Straus. Ecotoxicol. Environ. Saf. 38:109-120.

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

In vitro/in vivo	:	In vivo
Type	:	Distribution
Species	:	
Number of animals	:	
Males	:	
Females	:	
Doses	:	
Males	:	
Females	:	
Vehicle	:	
Route of administration	:	
Exposure time	:	
Product type guidance	:	
Decision on results on acute tox. tests	:	
Adverse effects on prolonged exposure	:	
Half-lives	:	1st: bone Estimated to be about 50 days 2nd: 3rd:
Toxic behavior	:	
Deg. product	:	
Deg. products CAS#	:	
Method	:	Other
Year	:	2005
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Remark	:	Barium sulfate is administered as a drug either orally or rectally because it has radiopaque properties that aid in diagnostic X-ray imaging. Most of the drug is excreted in the feces within a few days and is virtually absent within two weeks. Residual amounts of barium sulfate may be retained in the bone or teeth since it can mimic calcium and be absorbed by calcified tissue. Inhaled barium sulfate dust, not cleared by ciliary action, may accumulate in the lungs in sufficient quantities to cause baritosis (benign pneumoconiosis). Barium clearance is increased by intravenous administration of saline solutions. In Sprague-Dawley rats, fasting increased the concentration of barium in the blood.

Reliability	:	(2) valid with restrictions Credible information consistent with physical properties; Data taken from a secondary literature source (electronic database)
Reference	:	Hazardous Substances Data Bank http://toxnet.nlm.nih.gov (accessed 8/16/05) http://risk.lsd.ornl.gov/tox/profiles/barium_f_V1.shtml#te (accessed 11/10/05)
In vitro/in vivo	:	In vivo
Type	:	Distribution
Species	:	Rat
Number of animals	:	
Males	:	
Females	:	
Doses	:	
Males	:	40 mg
Females	:	40 mg
Vehicle	:	
Route of administration	:	Inhalation
Exposure time	:	60 days
Product type guidance	:	
Decision on results on acute tox. tests	:	
Adverse effects on prolonged exposure	:	
Half-lives	:	1st: 2nd: 3rd:
Toxic behavior	:	
Deg. product	:	
Deg. products CAS#	:	
Method	:	Other
Year	:	1990
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Method	:	Two-month inhalation exposure followed by 4 week post-exposure period
Result	:	Barium levels increased in the bones (particularly the jaw and femur), but the rate of accumulation decreased with continued exposure. The barium content in the lungs was highest two weeks after exposure initiation, but decreased over the next four weeks. However, it increased again during the following 4-week non-exposure period. No increase in barium was noted in lymph nodes.
Reliability	:	(2) valid with restrictions Results are generally consistent with other known information regarding barium metabolism. Data taken from a secondary literature source (electronic database)
Reference	:	http://toxnet.nlm.nih.gov (accessed 8/16/05)

5.1.1 ACUTE ORAL TOXICITY

Type	:	LD50
Value	:	
Species	:	Rat
Strain	:	Other: CBL-Wistar

Sex	:	No data
Number of animals	:	
Vehicle	:	Other: Assumed to be water administered in 150% (wt/v) suspension
Doses	:	188, 225, 263, 300, 338 or 375 g/Kg
Method	:	other
Year	:	1985
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Method	:	Single dose administered intragastrically. Young rats weighing 130-160 grams were fasted for 16 hours prior to dose administration. Clinical measurements were made for 3-14 days or until death occurred.
Result	:	The interval to death decreased with increasing barium dosage.
Remark	:	The cause of death was determined to be stomach rupture due to dosing errors.
Reliability	:	(3) invalid Dosing errors confounded the study
Reference	:	USEPA Drinking Water Criteria Document for Barium (1985)

5.1.2 ACUTE INHALATION TOXICITY

5.1.3 ACUTE DERMAL TOXICITY

Remark	:	Not expected to cross intact skin due to the low water solubility and physical form of the test material
Reliability	:	(2) valid with restrictions Source is peer-reviewed published document.
Reference	:	ATSDR, 1992 (Agency for Toxic Substances and Disease Registry, Toxicological Profile for Barium and Compounds, July 1992)

5.4 REPEATED DOSE TOXICITY

5.5 GENETIC TOXICITY – “IN VITRO”

5.6 GENETIC TOXICITY – “IN VIVO”

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/ TERATOGENICITY

5.10 EXPOSURE EXPERIENCE

Remark	:	Accidental exposure: Children had barium sulfate accidentally injected into the eye under very high pressure after cutting into the centers of certain types of golf balls. X-ray diffraction and electron probe exams identified barium sulfate in the extra-ocular tissue. Little injury resulted. Other details were not available.
Year	:	1986
CLP	:	no
Test substance	:	Barium sulfate (possibly mixed with other compounds)
Reliability	:	(3) invalid There is some question about the identity of substance involved in this accidental exposure.
Reference	:	Grant, W.M. (1986) Toxicology of the Eye. 3rd Edition. Springfield: Charles C. Thomas Publisher, p. 134

IUCLID

Data Set

Existing Chemical	:	ID: 28987-17-9
CAS No.	:	28987-17-9
EINECS Name	:	barium bis(nonylphenolate)
EC No.	:	249-359-7
Molecular Formula	:	C15H24O.1/2Ba

Producer related part

Company	:	Epona Associates, LLC
Creation date	:	18.12.2003

Substance related part

Company	:	Epona Associates, LLC
Creation date	:	18.12.2003
Status	:	
Memo	:	SOCMA MCC
Printing date	:	16.03.2006
Revision date	:	
Date of last update	:	16.03.2006
Number of pages	:	21
Chapter (profile)	:	Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

1.0.2 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

1.1.0 SUBSTANCE IDENTIFICATION

1.1.1 GENERAL SUBSTANCE INFORMATION

Purity type	**:**	
Substance type	**:**	organometallic
Physical status	**:**	
Purity	**:**	
Colour	**:**	
Odour	**:**	

18.12.2003

1.1.2 SPECTRA

1.2 SYNONYMS AND TRADENAMES

1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

1.6.2 CLASSIFICATION

1.6.3 PACKAGING

1.7 USE PATTERN

1.7.1 DETAILED USE PATTERN

1.7.2 METHODS OF MANUFACTURE

1.8 REGULATORY MEASURES

1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

1.11 ADDITIONAL REMARKS

1.12 LAST LITERATURE SEARCH

1.13 REVIEWS

2.1 MELTING POINT

Value	:	= 263.5 °C
Sublimation	:	
Method	:	other: EPIWIN
Year	:	2003
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Melting Point Estimation (MPBPWIN v1.41): (Mean or Weighted MP)
Reliability	:	(2) valid with restrictions Estimated data using EPIWIN
Flag	:	Critical study for SIDS endpoint

18.12.2003 (1)

2.2 BOILING POINT

Value	:	= 609 °C at
Decomposition	:	
Method	:	other: EPIWIN
Year	:	2003
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Boiling Point Estimation (MPBPWIN v1.41):(Adapted Stein & Brown method)
Reliability	:	(2) valid with restrictions Estimated data using EPIWIN
Flag	:	Critical study for SIDS endpoint

18.12.2003 (1)

2.3 DENSITY

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Value	:	< .0000000000001 hPa at °C
Decomposition	:	
Method	:	other (calculated)
Year	:	2002
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Vapor Pressure Estimations (MPBPWIN v1.41) Modified Grain method
Result	:	VP(mm Hg,25 deg C): 1.05E-013
Reliability	:	(2) valid with restrictions Estimated data using EPIWIN
Flag	:	Critical study for SIDS endpoint

18.12.2003 (1)

2.5 PARTITION COEFFICIENT

Partition coefficient	:	octanol-water
Log pow	:	at °C
pH value	:	
Method	:	OECD Guide-line 107 "Partition Coefficient (n-octanol/water), Flask-shaking Method"
Year	:	2006
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	This study followed the procedures indicated by the following internationally accepted guidelines and recommendations: OECD Guideline for Testing of Chemicals No. 107: "Partition coefficient (n-octanol/ water): Shake Flask Method"; adopted July 27, 1995. OECD Guideline for Testing of Chemicals No. 117: "Partition coefficient (n-octanol/ water), High Performance Liquid Chromatography (HPLC) Method"; adopted March 30, 1989. EEC Directive 92/69, Part A, Methods for the determination of physico-chemical properties, A.8 "Partition coefficient", EEC Publication No. L383A, December 1992.
Result	:	In study 849096 RCC was supposed to determine the partition coefficient (n-octanol/water) of BARIUM NONYLPHENOL. The general formula of the metal carboxylates is MxOrgy where M is the following Metal ion: Barium Ba^{2+} The organic part of the molecule is of the following organic species: Nonylphenol anion where the latter is poorly defined in chemical structure. In an aqueous environment the following equilibrium will establish: $Mx^+ + y\ HOrg = Mx^+ + y\ Org^- = Mx^+ + x\ OH^- + y\ Org^-$ $Mx^+ + y\ Org^-$ will be able to precipitate according to their solubility in water. Likewise will $Mx^+ + x\ OH^-$ be able to precipitate. Adding n-octanol to the system will add additional equilibria to the system with no means to make sure the equilibrium established between the aqueous and the organic phase will be based upon the undissociated form of the test item as requested by the guideline.
Reliability	:	(1) valid without restriction

13.03.2006 (3)

Partition coefficient	:	octanol-water
Log pow	:	= 11.78 at °C
pH value	:	

Method : other (calculated)
Year : 2003
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : Partition coefficient for nonyl phenol:
Log pow: 3.8 - 4.77 at 25 °C
Method: other (measured): see text
Year: 1990
GLP: yes
Remark: The ocatanol/water partition coefficient (Kow) of NP was determined at two concentrations in accordance with USEPA guidelines. Test vessels (25 ml Teflon centrifuge tubes) contained 18 ml of pH buffer, 1.9 ml of n-octanol, and 100 ul of a stock solution of 4-nonylphemol in n-octanol. Test vessels were agitated for one hour at 25 deg C and centrifuged at 10,000g for 30 minutes. The test substance was quantified in samples of Octanol and water from each vessel by high pressure liquid chromatography. The test substance was below the detection limit (32.5 ug/l) in all water samples. Therefore Kow values were reported as "greater than" values. Results of the study are summarised below.

	Mean log Kow	
Nominal pH	C1 (high)	C2 (low)
5	>4.77	>3.86
7	>4.70	>3.80
9	>4.75	>3.84

The data showed concentration dependence because the test substance was non-detectable in all water samples and the value < 32.5 ug/l was used to calculate Kow.
Source: ECB IULCID
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance: para-Nonylphenol provided by Schenectady Chemical Company.
Reported chemical purity > 95% p-nonylphenol - confirmed by subsequent gas chromatography analysis.
Partition coefficient for nonylphenol:
Log pow := 3.28 at 20 °C
Method: OECD Guide-line 107 "Partition Coefficient (n-octanol/water), Flask-shaking Method"
Year: 1981
GLP: no
Source: ECB IULCID
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Result : Log Octanol-Water Partition Coef (SRC):
Log Kow (KOWWIN v1.67 estimate) = 11

Reliability : (2) valid with restrictions
Modeling data for barium nonylphenate not expected to be reliable due to its low water solubility.

Flag : Critical study for SIDS endpoint
13.03.2006 (1)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	Water
Value	:	50 mg/l at 20 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	
Deg. product	:	
Method	:	
Year	:	2002
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	Approximate water solubility: 50 mg/L, as determined visually in preliminary study
Reliability	:	(2) valid with restrictions
Flag	:	Critical study for SIDS endpoint

19.12.2003 (2)

Solubility in	:	Water
Value	:	= 0 mg/l at 25 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	of very low solubility
Stable	:	
Deg. product	:	
Method	:	other: estimated
Year	:	2003
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Result	:	Water Sol Estimate from Fragments: Wat Sol (v1.01 est) = 5.7603e-007 mg/L Water Solubility Estimate from Log Kow (WSKOW v1.41): Water Solubility at 25 deg C (mg/L): 2.023e-008. log Kow used: 11.78 (estimated). no-melting pt equation used
Reliability	:	(3) invalid Estimated data using EPIWIN

19.12.2003 (1)

2.6.2 SURFACE TENSION

2.7 FLASH POINT

2.8 AUTO FLAMMABILITY

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

2.11 OXIDIZING PROPERTIES

2.12 DISSOCIATION CONSTANT

Method	:	OECD Guide-line 112
Year	:	2002
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	50 mg/L, as determined visually in preliminary study
Result	:	Mean (N = 3) pKb values were 8.34 (SD = 0.0352), 6.81 (SD = 0.0862) and 5.62 (SD = 0.0684) at 20°C
Source	:	Morningstar Consulting
Test condition	:	Three replicate samples of phenol, nonyl-, barium salt were prepared at a nominal concentration of 25 mg/L by fortification of 100 mL degassed water (ASTM Type II) with a 10 mg/mL stock solution of the test substance in tetrahydrofuran. Each sample was titrated against 0.00025 N hydrochloric acid while maintained at a test temperature of 20±1°C. At least 10 incremental additions were made before the equivalence point and the titration was carried past the equivalence point. Values of pK were calculated for a minimum of 10 points on the titration curve. Phosphoric acid and 4-nitrophenol were used as reference substances.
Test substance	:	Therm-chek RC 225, lot number 52737, CAS no. 28987-17-9, received from Ferro Corporation. Viscous amber liquid, purity of 12.6% barium.
Conclusion	:	The results indicate that dissociation of the test substance will occur at environmentally-relevant pH values (approximately neutral) and at physiologically-relevant pH values (approximately 1.2).
Reliability	:	(1) valid without restriction
Flag	:	Critical study for SIDS endpoint

19.12.2003 (2)

2.13 VISCOSITY

2.14 ADDITIONAL REMARKS

3.1.1 PHOTODEGRADATION

DIRECT PHOTOLYSIS

Halflife t1/2	:	= .1 day(s)
Degradation	:	% after
Quantum yield	:	

INDIRECT PHOTOLYSIS

Sensitizer	:	
Conc. of sensitizer	:	
Rate constant	:	= .000000000128 cm^3/(molecule*sec)
Degradation	:	% after
Deg. product	:	
Method	:	other (calculated)
Year	:	2003
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4

Result : Atmospheric Oxidation (25 deg C) [AopWin v1.91]:
Hydroxyl Radicals Reaction:
OVERALL OH Rate Constant = 128.7550 E-12 cm3/molecule-sec
Half-Life = 0.083 Days (12-hr day; 1.5E6 OH/cm3)
Half-Life = 0.997 Hrs
Ozone Reaction:
No Ozone Reaction Estimat

Reliability : (2) valid with restrictions
Estimated data using EPIWIN

13.03.2006 (1)

3.1.2 STABILITY IN WATER

3.1.3 STABILITY IN SOIL

3.2.1 MONITORING DATA

3.2.2 FIELD STUDIES

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type	:	fugacity model level III
Media	:	
Air	:	% (Fugacity Model Level I)
Water	:	% (Fugacity Model Level I)
Soil	:	% (Fugacity Model Level I)
Biota	:	% (Fugacity Model Level II/III)
Soil	:	% (Fugacity Model Level II/III)
Method	:	other: estimated
Year	:	2003

Result : Level III Fugacity Model:

	Mass Amount	Half-Life	Emissions

	(percent)	(hr)	(kg/hr)
Air	0.0526	1.99	1000
Water	3.43	900	1000
Soil	28.3	900	1000
Sediment	68.2	3.6e+003	0

Persistence Time: 1.63e+003 hr

Reliability : (2) valid with restrictions
Estimated data using EPIWIN

Flag : Critical study for SIDS endpoint

13.03.2006 (1)

3.3.2 DISTRIBUTION

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	semistatic
Species	:	Oncorhynchus mykiss (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
LL50	:	= 1.3
Limit test	:	
Analytical monitoring	:	yes
Method	:	OECD Guide-line 203 "Fish, Acute Toxicity Test"
Year	:	2006
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4

Method : Following preliminary range-finding tests, fish were exposed, in groups of seven, to Water Accomodated Fractions (WAFs) of the test material over a range of nominal loading rates of 1.0, 1.8, 3.2, 5.6 and 10 mg/l for a period of 96 hours at a temperature of approximately 14oC under semi-static conditions. The number of mortalities and any sub-lethal effects of exposure in each test and control vessel were determined 3 and 6 hours after the start of exposure and then daily throughout the test until termination after 96 hours.

Result : Analysis of the WAFs was conducted on the fresh test media at 0 and 72 hours and on the 24-Hour old or expired test media at 24 and 96 hours. The results from analysis of the fresh test media showed measured concentrations to range from 0.548 to 3.68 mg/l. Analysis of the old or expired test media showed measured concentrations to range from 0.282 to 5.71 mg/l. On each sampling occasion an increase in measured test concentrations was shown with increasing loading rate. However, with one exception (10 mg/l loading rate WAF over the initial dosing period of 0 to 24 hours) the measured test concentrations were shown to decline over each 24-Hour dosing period. This decline in measured concentrations was considered to be due to possible adsorption of the test material to the test fish and/or their waste products as the test material has a high Log Kow of 11.78 (estimated by a computer software package for predicting the properties of test materials (EPIWIN Version 3.11 2003)) indicating a high potential for the test material to accumulate in or adsorb to organic matter.

Given that toxicity cannot be attributed to a single component or a mixture of components but to the test material as a whole, the results were based on nominal loading rates only.

Temperature was maintained at approximately 14 deg C throughout the test, while there were no treatment-related differences for oxygen concentration or pH.

Cumulative Mortality Data in the Definitive Test
(initial population = 7)

Nominal Loading	% Mortality

Rate (mg/l)	Cumulative Mortality 3hr	6hr	24hr	48hr	72hr	96hr	96hr
Control	0	0	0	0	0	0	0
1.0	0	0	0	0	0	0	0
1.8	0	0	0	4	6	7	100
3.2	0	0	5	7	7	7	100
5.6	0	0	7	7	7	7	100
10	7	7	7	7	7	7	100

Sublethal Effects of Exposure in Definitive Test:
Control: No abnormalities detected
1.0 mg/l: No abnormalities detected
1.8 mg/l: Swimming at the bottom with increased pigmentation in 1/3 fish at 48 hr
3.2 mg/l: Swimming at the bottom in 1/2 at 24 hr and swimming at the surface in 1/2 at 24 hr
5.6 mg/l: Swimming at the bottom in 3/7 at 3 hr, 4/7 at 6 hr and swimming at the surface in 3/7 at 6 hr
10 mg/l: All fish dead by 3 hr

Analysis of the mortality data by the trimmed Spearman-Karber method at 24, 48 and 72 hours and the geometric mean method at 3, 6 and 96 hours based on the nominal loading rates gave the following results:

Time limits (hr)	LL50 (mg/l)	95% Confidence (mg/l)
3	7.5	5.6 - 10
6	7.5	5.6 - 10
24	2.8	2.3 - 3.4
48	1.7	1.4 - 2.1
72	1.5	1.3 - 1.7
96	1.3	1.0 - 1.8

Conclusion : The 96-Hour LL50 (Lethal Loading rate) based on nominal loading rates was 1.3 mg/l loading rate WAF with 95% confidence limits of 1.0 - 1.8 mg/l loading rate WAF. The No Observed Effect Loading rate was 1.0 mg/l loading rate WAF.

Reliability : (1) valid without restriction
Guideline study

Flag : Critical study for SIDS endpoint

13.03.2006 (4)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

4.5.1 CHRONIC TOXICITY TO FISH

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

5.1.1 ACUTE ORAL TOXICITY

5.1.2 ACUTE INHALATION TOXICITY

5.1.3 ACUTE DERMAL TOXICITY

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

5.2.2 EYE IRRITATION

5.3 SENSITIZATION

5.4 REPEATED DOSE TOXICITY

Type	:	Sub-acute
Species	:	rat
Sex	:	male/female
Strain	:	Sprague-Dawley
Route of admin.	:	gavage
Exposure period	:	7 days
Frequency of treatm.	:	daily
Post exposure period	:	none
Doses	:	150, 500 and 1000 mg/kg/day.
Control group	:	yes, concurrent vehicle
NOAEL	:	150 - mg/kg bw
Method	:	other
Year	:	2006
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4

Method : The test material was administered by gavage to three groups, each of five male and five female Sprague-Dawley Crl:CD® (SD) IGS BR strain rats, for up to seven consecutive days, at dose levels of 150, 500 and 1000 mg/kg/day. A control group of five males and five females was dosed with vehicle alone (Polyethylene glycol 400). On day four of treatment the intermediate dose level was reduced from 500 mg/kg/day to 250 mg/kg/day. Clinical signs, bodyweight development and food and water consumption were monitored during the study. Organ weight data was evaluated at the end of the study and all

animals were subjected
to a gross necropsy examination.

Result : Mortality. All animals treated with 1000 mg/kg/day were found dead or killed in extremis on
Day 3 of treatment. Two females treated with 500 mg/kg/day were also killed in extremis on Day
3 of treatment.
Clinical Observations. Animals treated with 1000 mg/kg/day showed clinical signs that included
staining around the snout, mouth and ano-genital region, decreased respiration, hunched posture,
lethargy, ataxia, pallor of the extremities, diarrhoea, piloerection and tiptoe gait.
Sporadic instances of increased salivation was first observed following dosing on Day 1 in
1000 mg/kg/day animals and by post dose Day 4 were also evident in animals from the remaining
treatment groups. In addition, two females treated with 500 mg/kg/day showed similar
observations to those seen in animals treated with 1000 mg/kg/day and were killed in extremis.
One male treated with 150 mg/kg/day showed staining around the mouth on one occasion. A
kinked tail was noted for one female at this dose level. This is likely to be a result of physical
damage and is therefore considered to be unrelated to treatment and of no toxicological
significance.

Bodyweight. No treatment-related effects were detected.
Food Consumption. No treatment-related effects were detected.
Water Consumption. No treatment-related effects were detected.
Organ Weights. Males treated with 150 and 500 mg/kg/day showed an increase in kidney and
liver weights, both absolute and relative to terminal bodyweight, compared to controls.
Necropsy. Sloughing of the glandular and non-glandular region was observed in the stomach of
two males and one female treated with 1000 mg/kg/day and two females treated with
500 mg/kg/day.

Conclusion : Conclusion. Oral administration of Barium Nonyl Phenol to rats, by gavage, at dose levels of
150, 250 and 1000 mg/kg/day for seven consecutive days resulted in deaths at 1000 and
250 mg/kg/day. Clinical signs of toxicity were observed for animals treated with 1000 and
250 mg/kg/day. An increase in liver and kidney weights was also observed for males treated with
1000 mg/kg/day.
The No Observed Effect Level is considered to be 150 mg/kg bw.

Reliability : (1) valid without restriction

Flag : Critical study for SIDS endpoint

16.03.2006 (5)

5.5 GENETIC TOXICITY ‘IN VITRO‘

5.6 GENETIC TOXICITY ‘IN VIVO‘

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

5.11 ADDITIONAL REMARKS

6.1 ANALYTICAL METHODS

6.2 DETECTION AND IDENTIFICATION

7.1 FUNCTION

7.2 EFFECTS ON ORGANISMS TO BE CONTROLLED

7.3 ORGANISMS TO BE PROTECTED

7.4 USER

7.5 RESISTANCE

8.1 METHODS HANDLING AND STORING

8.2 FIRE GUIDANCE

8.3 EMERGENCY MEASURES

8.4 POSSIB. OF RENDERING SUBST. HARMLESS

8.5 WASTE MANAGEMENT

8.6 SIDE-EFFECTS DETECTION

8.7 SUBSTANCE REGISTERED AS DANGEROUS FOR GROUND WATER

8.8 REACTIVITY TOWARDS CONTAINER MATERIAL

(1) EPIWIN v 3.11

(2) Lezotte, F.J. and W.B. Nixon, 2002. Determination of the dissociation constant of phenol, nonyl-, barium salt, Wildlife International, Ltd. Study No. 534C-115, conducted for the Metals Carboxylate Coalition.

(3) RCC Ltd. (2006) Expert Statement: Determination of the Partition Coefficient (N-Octanol/Water) of Barium Nonylphenol. RCC Study Number 849096

(4) SafePharm Laboratories (2006) Barium Nonyl Phenol: Acute toxicity to rainbow trout (Oncorhynchus mykiss) SPL Project Number 1683/013

(5) SafePharm Laboratories (2006) Draft Report: Barium nonyl phenol Seven Day Repeated Dose Repeated Dose Oral (gavage) Toxicity Study in the Rat. SPL PROJECT NUMBER: 1683-0014

10.1 END POINT SUMMARY

10.2 HAZARD SUMMARY

10.3 RISK ASSESSMENT

1. General Information

ID 10361-37-2

Date 9 Nov 2005

201-16427E

1.0 SUBSTANCE INFORMATION

Generic Name	:	Barium chloride
Chemical Name	:	Barium dichloride
CAS Registry No.	:	10361-37-2
Component CAS Nos.	:	
EINECS No.	:	233-788-1
Structural Formula	:	$BaCl_2$
Additional description	:	
Molecular Weight	:	208.23
Synonyms and Tradenames	:	Barium (II) chloride; RTECS CQ8750000; HSDB 2633; NCI C61074
References	:	ATSDR, 1992 (Agency for Toxic Substances and Disease Registry, Toxicological Profile for Barium and Compounds, July 1992)
		O'Neil, M.J., Smith, A., Heckelman, P.E., and J.R. Obenchain (eds.). 2002. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Ed. Merck & Co., Inc., Whitehouse Station, NJ. (molecular weight value)

2.1 MELTING POINT

Value	:	= 963 °C
Decomposition	:	
Sublimation	:	
Method	:	Other
Year	:	2002
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Reliability	:	(2) valid with restrictions Source is well established data compendium.
Reference	:	O'Neil, M.J., Smith, A., Heckelman, P.E., and J.R. Obenchain (eds.). 2002. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Ed. Merck & Co., Inc., Whitehouse Station, NJ.

2.2 BOILING POINT

Value	:	= 1560 °C
Decomposition	:	
Method	:	Other
Year	:	1990
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Reliability	:	(2) valid with restrictions Source is well established NIOSH reference.
Reference	:	Department of Health and Human Services, National Institute for Occupational Safety and Health. 1990. NIOSH Pocket Guide to Chemical Hazards. U.S. Government Printing Office, Washington, DC.

2.3 DENSITY

Type	:	density
Value	:	= 3.86 g/cm^3
Method		Other
Year	:	2002
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Reliability	:	(2) valid with restrictions Source is well established data compendium.
Reference	:	O'Neil, M.J., Smith, A., Heckelman, P.E., and J.R. Obenchain (eds.). 2002. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Ed. Merck & Co., Inc., Whitehouse Station, NJ.

2.4 VAPOUR PRESSURE

Type	:	
Value	:	
Decomposition	:	
Method	:	Other
Year	:	1990
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Result	:	Low based on melting point and boiling point data
Reliability	:	(2) valid with restrictions Source is well established NIOSH reference.
Reference	:	Department of Health and Human Services, National Institute for Occupational Safety and Health. 1990. NIOSH Pocket Guide to Chemical Hazards. U.S. Government Printing Office, Washington, DC.

2.5 PARTITION COEFFICIENT

Type	:	
Partition coefficient	:	
Log Pow	:	
pH value	:	
Method	:	Other
Year	:	2005
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Result	:	Compound dissociates and ionizes in water
Reliability	:	(2) valid with restrictions Information taken from a secondary literature source (electronic database)
Reference	:	http://en.wikipedia.org/wiki/Barium_chloride (accessed 18 Oct. 2005)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	Water
Value	:	= 37.5 other: g/100 cm^3 at 26 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
PKa	:	at °C
Description	:	
Stable	:	
Deg. product	:	
Method	:	Other
Year	:	2005
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Reliability	:	(2) valid with restrictions Data taken from a secondary literature source (electronic database)
Reference	:	http://en.wikipedia.org/wiki/Barium_chloride

(accessed 18 Oct. 2005)

Solubility in	:	Water
Method	:	Other
Year	:	2002
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Result	:	Very soluble in water
Reliability	:	(2) valid with restrictions Source is well established data compendium.
Reference	:	O'Neil, M.J., Smith, A., Heckelman, P.E., and J.R. Obenchain (eds.). 2002. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Ed. Merck & Co., Inc., Whitehouse Station, NJ.

3.1.1 PHOTODEGRADATION

3.1.2 STABILITY IN WATER

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type	:	
Media	:	
Air	:	% (Fugacity Model Level I)
Water	:	% (Fugacity Model Level I)
Soil	:	% (Fugacity Model Level I)
Biota	:	% (Fugacity Model Level II/III)
Soil	:	% (Fugacity Model Level II/III)
Year	:	2005
Test substance	:	As prescribed by 1.1-1.4
Method	:	EPIWIN
Result	:	Level III Fugacity Model:

	Mass Amount (percent)	Half-Life (hr)	Emissions (kg/hr)
Air	9.42e-006	1e+005	1000
Water	46	900	1000
Soil	53.9	900	1000
Sediment	0.0906	3.6e+003	0

Persistence Time: 813 hr

Reliability	:	(2) valid with restrictions Data were obtained by modeling.
Reference	:	EPIWIN (ver 3.11) (2005)

3.3.2 DISTRIBUTION

3.5 BIODEGRADATION

4.1 ACUTE TOXICITY TO FISH

Type	:	Flow-through
Species	:	Rainbow trout (*Onchorhynchus mykiss*)
Exposure period	:	
Unit	:	ug/L
NOEC	:	
LC0	:	
LC50	:	= 42,700
LC100	:	
Limit test	:	
Analytical monitoring	:	No
Method	:	other
Year	:	1980
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Method	:	Donaldson trout were used in the study.
Result	:	Slight toxicity in Rainbow trout, but determined not to be acutely toxic
Remark	:	The bioavailability and resultant aquatic toxicity of barium chloride are affected by a variety of factors, including water hardness, pH, dissolved organic carbon and temperature. Average reported LC_{50} values for barium chloride for various species of fish include 1,000,000 µg/L in eight studies of Mummichog (*Fundulus heteroclitus*) and 2,036,667 µg/L in three studies of Western mosquitofish (*Gambusia affinis*) and 870,000 µg/L in one study of Carp (Leuciscus idus melanotus) and 150,000 µg/L in one study of Brown trout (*Salmo trutta*) and four studies of Coho salmon (*Onchorhynchus kisutch)* using static exposures ranged from a 3 day NOEC of 88,800 µg/L to a 6 day NOEC of 282,000 µg/L (data derived from U.S. EPA, AQUIRE database, 2005)
Reliability	:	(2) valid with restrictions Insufficient details are present to indicate whether all test methods followed the Guidelines. However, methods and number of studies with similar results seem sufficient to accept the data
Reference	:	http://www.pesticideinfo.org/List_AquireAcuteSum.jsp?Rec_Id=PC35604&Taxa_Group=Fish) (accessed on 11/19/2005).

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	Flow-through
Species	:	*Daphnia magna* (Crustacea)
Exposure period	:	48 hour(s)
Unit	:	ug/L
LC50	:	= 14,500
Limit test	:	
Analytical monitoring	:	
Method	:	other
Year	:	1972
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4

Result	:	LC50 = 14,500 µg/L (without food)
Remark	:	The bioavailability and resultant aquatic toxicity are affected by a variety of factors, including water hardness, pH, dissolved organic carbon and temperature. Several crustacean studies were found including two studies conducted in 1988 in Yellow Rock Crab (*Cancer anthonyi*) showing embryo toxicity after 7 days in flow-through studies at concentrations of 10,000 and 100,000 µg/L, respectively. Slight toxicity was seen in several Crayfish (*Austropotamobius pallipes pall*) studies conducted in 1973 in a static system. (U.S. EPA, AQUIRE database, 2005).
Reliability	:	(2) valid with restrictions Comparable to guideline study with adequate documentation.
Reference	:	Biesinger, K. E. and G. N. Christensen. 1972. Effects of Various Metals on Survival, Growth, Reproduction, and Metabolism of *Daphnia magna*. J. Fish. Res. Bd. Canada, 29:1691-1700. http://www.pesticideinfo.org/List_AquireAll.jsp?Rec_Id=PC35604&Taxa_Group=Crustaceans (AQUIRE database info accessed on 11/9/05)

4.3 TOXICITY TO AQUATIC PLANTS (E.G., ALGAE)

Species	:	Other algae: Duckweed (*Lemna minor*)
Endpoint	:	Growth rate
Exposure period	:	96 hrs
Unit	:	ug/L
EC50	:	= 25,000
Limit test	:	
Analytical monitoring	:	
Method	:	other
Year	:	1986
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Method	:	Static test
Remark	:	The bioavailability and resultant aquatic toxicity are affected by a variety of factors, including water hardness, pH, dissolved organic carbon and temperature The reported minimum toxic dose in aquatic moss (*Physcomitrella patens*) was 208.2 µg/L in studies published in 1990 and 1993 according to ASTM STP 1179 and 1091. (U.S. EPA, AQUIRE database, 2005). Reagent grade barium chloride was moderately toxic in de-ionized water and nontoxic in Illinois river water to Duckweed (Wang)
Reliability	:	(2) valid with restrictions. Comparable to guideline study
Reference	:	Wang, W. (1986) The Effect of River Water on Phytotoxicity of Ba, Cd and Cr. Environ. Pollut. Ser. B 0143-148. (as cited in AQUIRE data base accessed 10/19/05)

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

In vitro/in vivo	:	
Type	:	
Species	:	
Number of animals	:	

Males	:	
Females	:	
Doses	:	
Males	:	
Females	:	
Vehicle	:	
Route of administration	:	
Exposure time	:	
Product type guidance	:	
Decision on results on acute tox. tests	:	
Adverse effects on prolonged exposure	:	
Half-lives	:	1st: bone Estimated to be about 50 days 2nd: 3rd:
Toxic behavior	:	
Deg. product	:	
Deg. products CAS#	:	
Method	:	Other
Year	:	2005
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Remark	:	Human and animal studies suggest that barium chloride and other soluble barium salts administered orally, by injection or intragastrically are rapidly absorbed from the intestinal tract into the bloodstream and then into the muscle, lungs and bone with very little being retained by the soft tissues (with the exception of the eye). Fasted animals showed increased absorption of barium compounds (20% vs. 7%) than those with access to food. Barium compounds are generally absent from the blood within 24 hours, but retention in the bone is similar to calcium with a half-life estimated at 50 days. Approximately half the dose is bound to protein. These compounds are known to stimulate striated, cardiac and smooth muscle by displacing calcium in cell membranes which increases membrane permeability. Barium compounds activate secretion of catecholamines. Death may be caused by failure of muscular contractions resulting in respiratory failure and cardiovascular collapse. Non-lethal doses in rats were largely excreted in the feces (20%) and to a lesser extent in the urine (7%) within the first 24 hours. Barium clearance is increased by intravenous administration of saline solutions.
Test substance	:	Barium chloride and other soluble barium salts
Reliability	:	(2) valid with restrictions Summary based on peer-reviewed publications
Reference	:	Hazardous Substances Data Bank http://toxnet.nlm.nih.gov (accessed 8/16/05) //risk.lsd.ornl.gov/tox/profiles/barium_f_V1.shtml#te (accessed 11/9/2005)
In vitro/in vivo	:	In vivo
Type	:	Absorption
Species	:	Syrian hamster
Number of animals	:	
Males	:	

Females	:	
Doses	:	
Males	:	
Females	:	
Vehicle	:	
Route of administration	:	Inhalation
Exposure time	:	4 hour(s)
Product type guidance	:	
Decision on results on acute tox. tests	:	
Adverse effects on prolonged exposure	:	
Half-lives	:	1st: 2nd: 3rd:
Toxic behavior	:	
Deg. product	:	
Method	:	other
Year	:	
GLP	:	No
Test substance	:	Other TS
Remark	:	Nasopharynx was the major absorption site for inhaled aerosols of soluble barium, especially for readily soluble aerosols having a mass medium aerodynamic diameter of > 5 µm. Year of study unknown, but cited in 1990
Result	:	Barium absorption into the general circulation from nasal passages was approximately 61% as compared to 11% from GI absorption after four hours
Test substance	:	Labeled barium chloride
Reliability	:	(2) valid with restrictions Summary cited in peer-reviewed WHO report
Reference	:	WHO Environmental Health Criteria 107, Barium (1990)

5.1.1 ACUTE ORAL TOXICITY

Type	:	LD50l
Value	:	= 132 mg/kg bw
Species	:	Rat
Strain	:	No data
Sex	:	Male/female
Number of animals	:	80
Vehicle	:	Water
Doses	:	Other: Not specified
Method	:	other
Year	:	1980
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Method	:	Single dose administered by gavage (10 per dose level)
	:	Adult (60-70 days of age) and weanling (21-25 days of age) were used to determine the LD50 using BaCl2 dissolved in distilled water and administered by gavage. All animals were observed for 14 days.
Result	:	220 mg/Kg (500 mg BaCl2/Kg) in weanling rats (confidence limits 434-600) 132 mg/Kg (300 mg BaCl2/Kg) in adults (confidence limits 255-369). The

		results were used to select the dose for subchronic studies (Tardiff, et al.)
Remark	:	Acute LD50 values in rats ranged from 118-500 mg/Kg, 7-29 mg/Kg in mice, 90 mg/Kg in dogs, 170 mg/Kg in rabbits and 800-1200 mg/Kg in horses (Friberg, et al. 1986) Acute oral toxicity in humans is reported to occur at 80 mg/Kg (McCauley, et al. Chapter XVIII, page 197-210, book unknown)
Reliability	:	(2) valid with restrictions References from peer-reviewed publication
Reference	:	Friberg cited in Hazardous Substances Data Bank http://toxnet.nlm.nih.gov (accessed 8/16/05) Tardiff, R.G., M. Robinson, N. S. Ulmer. (1980) Subchronic Oral Toxicity of BaCl2 in Rats. J. Environ. Path. Toxicol. 4:267-275.

Type	:	LD50
Value	:	> 2000 ppm
Species	:	Rat
Strain	:	Other: F344/N
Sex	:	Male/female
Number of animals	:	
Vehicle	:	Water
Doses	:	
Method	:	other
Year	:	1994
GLP	:	No data
Test substance	:	Other TS
Remark	:	NTP probably followed GLP criteria during that time.
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Adequate documentation available in a study conducted by NTP.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.

Type	:	LD50
Value	:	>692 ppm
Species	:	Mouse
Strain	:	B6C3F1
Sex	:	Male/female
Number of animals	:	
Vehicle	:	Water
Doses	:	
Method	:	other
Year	:	1994
GLP	:	No data
Test substance	:	Other TS
Remark	:	NTP probably followed GLP criteria during that time
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Adequate documentation available in a study conducted by NTP.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.

5.1.2 ACUTE INHALATION TOXICITY

5.1.3 ACUTE DERMAL TOXICITY

Remark	:	Not expected to cross intact skin due to the high polarity of the various forms of barium compounds most commonly encountered
Reliability	:	
Reference	:	ATSDR, 1992 (Agency for Toxic Substances and Disease Registry, Toxicological Profile for Barium and Compounds, July 1992)

5.2.1 SKIN IRRITATION

Remark	:	May be a human skin irritant, but no studies were found as confirmatory
Reliability	:	
Reference	:	ATSDR, 1992 (Agency for Toxic Substances and Disease Registry, Toxicological Profile for Barium and Compounds, July 1992)

5.2.2 EYE IRRITATION

Species	:	Rabbit
Concentration	:	
Dose	:	Other: 0.08 to 0.1 M solution
Exposure time	:	
Number of animals	:	
Vehicle	:	
Classification	:	
Method	:	Other
Year	:	1986
GLP	:	No data
Test substance	:	As prescribed by 1.1-1.4
Method	:	0.08 to 0.1 M solution injected into cornea (single injection); 10 minute dropping on eye after corneal epithelium was removed
Result	:	No opacification of cornea, but caused considerable iritis which subsided in a few days
Reliability	:	(3) invalid Non-standard method and few experimental details
Reference	:	Grant, W.M. (1986) Toxicology of the Eye. 3rd Edition. Springfield: Charles C. Thomas Publisher, p. 134

5.4 REPEATED DOSE TOXICITY

Type	:	Subchronic
Species	:	Rat

Strain	:	Other: F344/N
Sex	:	Male/female
Number of animals	:	
Route of admin.	:	Drinking water
Exposure period	:	13-Weeks
Frequency of treatment	:	Continuous
Post exposure period	:	None
Doses	:	125, 500, 1,000, 2,000 or 4,000 ppm corresponding to average daily doses of 10, 30, 65, 110 or 200 mg barium/kg/body weight in males and 10, 35, 65, 115 or 180 mg barium/kg/body weight in females
Control group	:	Yes, concurrent vehicle
NOAEL	:	
LOAEL	:	
Method	:	Other
Year	:	1994
GLP	:	No data
Test substance	:	Other TS
Method	:	10 per sex per dose level; Measurements included body weights, water consumption, clinical signs, hematology and clinical chemistry, neurobehavioral effects, major organ pathology
Result	:	Three males and one female died in the high dose group in the last week of the study. Final mean body weights in high dose group in both sexes were significantly lower than controls. Water consumption at 4,000 ppm was 30% lower than controls. No clearly related chemical effects were noted in neurobehavioral, cardiovascular or clinical signs. Serum phosphorus levels were significantly higher than controls in box sexes at 2,000 and 4,000 ppm. Renal tubule dilatation in the outer stripe of the medulla and cortex occurred at the 4,000 ppm group in males and females.
Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP.
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Comparable to guideline study with adequate documentation.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.
Type	:	Sub-chronic
Species	:	Mice
Strain	:	B6C3F1
Sex	:	Male/female
Number of animals	:	
Route of admin.	:	Drinking water
Exposure period	:	13 wk
Frequency of treatment	:	Continuous
Post exposure period	:	None
Doses	:	125, 500, 1,000, 2,000 or 4,000 ppm corresponding to average daily doses of 15, 55, 100, 205 or 450 mg barium/kg body weight to males and 15, 60, 110, 200 or 495 mg barium/kg body weight in females
Control group	:	Yes, concurrent vehicle
NOAEL	:	
LOAEL	:	
Method	:	Other
Year	:	1994
GLP	:	No data
Test substance	:	Other TS

Method	:	Groups of male and female rats (10 per sex per dose level) were given drinking water barium chloride dihydrate for 13 weeks. Animals were observed daily for clinical signs of toxicity and weighed weekly. Water intake was measured. Prior to study termination, blood samples were collected and analyzed for hematological and biochemical parameters. Following necropsy, gross pathological and histopathological examinations were conducted on selected target organs and tissues. Organs weights were also determined.
Results	:	Mortality was observed in six males and seven females at 4,000 ppm and in one male at 125 ppm. Final mean body weights at 4,000 ppm were significantly reduced (>30%) from controls. Water consumption was 18% lower than controls in males at 4,000 ppm while other doses were similar. Debilitation was observed in the surviving animals at 4,000 ppm. Absolute and/or relative liver weights in the 1,000, 2,000 and 4,000 ppm dose groups were significantly lower than controls. Multifocal to diffuse nephropathy characterized by tubule dilatation, regeneration and atrophy was observed in the high dose.
Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP.
Reliability	:	(2) valid with restrictions Comparable to guideline study with adequate documentation.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.

Type	:	Sub-acute
Species	:	Rat
Strain	:	Other: F344/N
Sex	:	Male/female
Route of admin.	:	Drinking water
Exposure period	:	14 days
Frequency of treatm.	:	continuous
Post exposure period	:	none
Doses	:	0, 125, 250, 500, 1,000 or 2,000 ppm
Control group	:	Yes, concurrent vehicle
Method	:	Other
Year	:	1994
GLP	:	No data
Test substance	:	Other TS

Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP.
Result	:	There were no findings in rats with the exception of decreased water consumption in high dose rats
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Comparable to guideline study with adequate documentation.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.

Type	:	Sub-acute
Species	:	Mouse
Strain	:	B6C3F1

Sex	:	Male/female
Route of admin.	:	Drinking water
Exposure period	:	14 days
Frequency of treatm.	:	continuous
Post exposure period	:	none
Doses	:	0, 40, 80, 173, 346 or 692 ppm
Control group	:	Yes, concurrent vehicle
Method	:	Other
Year	:	1994
GLP	:	No data
Test substance	:	Other TS
Method	:	Daily in drinking water. Measurements of body weights, clinical findings, water consumption, hematology, clinical chemistry, relative/absolute organ weights and neurobehavioral patterns
Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP.
Result	:	There were no findings in mice with the exception of increased absolute and relative liver weights in high dose mice.
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Comparable to guideline study with adequate documentation.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.

Type	:	Sub-chronic
Species	:	Rat
Strain	:	Charles River
Sex	:	Male/female
Number of animals	:	
Route of admin.	:	Drinking water
Exposure period	:	13 wk
Frequency of treatment	:	Continuous
Post exposure period	:	None
Doses	:	10, 50, or 250 ppm in drinking water (females had a slightly higher exposure to barium than males in all treatment groups)
Control group	:	Yes, concurrent vehicle
NOAEL	:	
LOAEL	:	
Method	:	
Year	:	1980
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Method	:	Subgroups of at least 5 rats per sex per dose level were sacrificed at 4, 8 or 13 weeks for measurement of biochemical or hematologic parameters, comprehensive histopathological examination and analysis of barium levels in selected tissues. Water consumption was measured daily with weekly recording of body weights, food consumption and the presence of clinical signs. Animals were observed for mortality daily. All tissues were weighed and either frozen for analysis of barium concentration or histologic examination. Clinical chemistry and hematology measurements were made. Statistical analysis of organ weights, hematology and clinical chemistry variables were conducted.
Results	:	No adverse effects were observed for food consumption, clinical signs,

body weight, hematology, serum enzymes, serum ions (Na, K, Ca), gross pathology and histopathology. Water consumption was slightly decreased in the high dose animals. A slight decrease in relative adrenal weight in treated animals was observed versus controls. Increased dose (but not exposure duration) resulted in increases in barium concentrations in liver, skeletal muscle, heart and bone with the highest concentrations observed in bone.

Remark : Two previous studies showed that barium was associated with an effect on adrenals altering the weight of the organ. Since barium results in the release of catecholamines from the adrenal medulla of cats and has a similar effect when bovine adrenals are perfused, the investigators postulated that barium acts on the chromatin cell membrane displacing calcium. Constant release of catecholamines results in depletion of intermediates and consequent atrophy.

Reliability : (2)valid with restrictions
Comparable to guideline study with adequate documentation.

Reference : Tardiff, R.G., M. Robinson, N. S. Ulmer. (1980) Subchronic Oral Toxicity of BaCl2 in Rats. J. Environ. Path. Toxicol. 4:267-275.

Type : Sub-chronic
Species : Rats
Strain : Sprague-Dawley
Sex : Male/female
Number of animals :
Route of admin. : Drinking water
Exposure period : 36, 46 or 68 weeks
Frequency of treatment : Continuous
Post exposure period : None
Doses : 1, 10, 100, or 250 ppm Ba in drinking water for 36 weeks or 1, 10, or 100 ppm Ba for 68 weeks or 0 or 250 ppm Ba for 46 weeks
Control group : Yes, concurrent vehicle
NOAEL :
LOAEL :
Method : Other
Year : Unknown
GLP : No
Test substance : As prescribed by 1.1-1.4

Method : This study utilized a number of non-standard measures and various dosing regimens. Animals were fed different diets with different levels of background barium present in the feed. 12 males per dose for 36 weeks; 10 males per dose for 68 weeks; 12 females per dose for 46 weeks

Results : There was a dose-related increase in retinal dystrophy and other studies do indicate that barium is absorbed in eye tissue. However, retinal dystrophy is a common degenerative disease in aging Sprague-Dawley rats and is affected by placement of lights and light penetration through plastic caging.

Remark : Results of this study are difficult to interpret due to the confounding factors presented above.

Reliability : (3) invalid
Due to relevant methodological deficiencies

Reference : McCauley, et al. (year unknown) Chapter XVIII, page 197-210, photocopied from an unknown book

5.5 GENETIC TOXICITY - "IN VITRO"

Type	:	Ames test
System of testing	:	Salmonella typhimurium strains TA 97, TA 98, TA 100, TA 1535 or TA 1537
Test concentrations	:	Unknown
Cytotoxic concentr.	:	Not determined
Metabolic activation	:	With and without
Result	:	negative
Method	:	other
Year	:	1994
GLP	:	No data
Test substance	:	Other TS
Method	:	Not specified in summary report
Result	:	At the concentration tested, there was no indication of any mutagenic activity with or without exogenous metabolic activation
Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP.
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Acceptable study with adequate documentation similar to Guideline study
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.
Type	:	
System of testing	:	Escherichia coli $WP_s(\lambda)$
Test concentrations	:	> 100 µg/well and 0.78 µg/well
Cytotoxic concentr.	:	
Metabolic activation	:	without
Year	:	1991
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Method	:	Microscreen assay; Method of Rossman et al., 1984. Environ. Mut., 6:59.
Test substance	:	Reagent grade
Reliability	:	(2) valid with restrictions Comparable to guideline study with adequate documentation.
Reference	:	Rossman, T.G., M. Molina, L. Meyer, P. Boone, C. B. Klein, Z. Wang, F. Li, W.C. Lin and P. L. Kinney. 1991. Performance of 133 compounds in the lambda prophage induction endpoint of the Microscreen assay and a comparison with S. typhimurium mutagenicity and rodent carcinogenicity assays. Mut. Res., 260:349-367.
Type	:	Mouse lymphoma assay
System of testing	:	Cultured mouse lymphoma cells – L5178/$TK^{+/-}$
Test concentrations	:	Not specified
Cytotoxic concentr.	:	Not determined
Metabolic activation	:	with and without
Result	:	Positive
Year	:	1994
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4
Method	:	Method of Clive et al., 1972. Mutation Res., 16:77-87.

Result	:	Mutagenic in the presence of metabolic activation (S-9); negative without activation and equivocal in other assays with S-9 activation
Reliability	:	(2) valid with restrictions Acceptable study with adequate documentation.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.

Type	:	Chromosome aberration
System of testing	:	Mouse bone marrow cells
Test concentrations	:	50, 160, 500, 1,600 or 5,000 µg/mL
Cytotoxic concentr.	:	
Metabolic activation	:	With and without
Result	:	negative
Method	:	other
Year	:	1983
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4

Result	:	Negative in two trials without activation and negative in two additional trials with exogenous activation with S-9.
Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP.
Reliability	:	(2) valid with restrictions Acceptable study with adequate documentation.
Reference	:	National Toxicology Program. (1983). Accessed 12/20/2004 http://ntp-apps.niehs.nih.gov/

Type	:	Sister chromatid exchange assay
System of testing	:	
Test concentrations	:	50, 160, 500, 1,600 or 5,000 µg/mL
Cytotoxic concentr.	:	
Metabolic activation	:	With and without
Result	:	negative
Method	:	other
Year	:	1983
GLP	:	No
Test substance	:	As prescribed by 1.1-1.4

Result	:	Negative in two trials without activation and negative in two additional trials with exogenous activation with S-9.
Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP.
Reliability	:	(2) valid with restrictions Acceptable study with adequate documentation.
Reference	:	National Toxicology Program. (1983). Accessed 12/20/2004 http://ntp-apps.niehs.nih.gov/

5.6 GENETIC TOXICITY – "IN VIVO"

5.7 CARCINOGENICITY

Species	:	Rats
Strain	:	Other: F344/N
Sex	:	Male/female
Route of admin.	:	Drinking water
Exposure period	:	104 weeks (males) or 105 weeks (females)
Frequency of treatment	:	Continuous
Post exposure period	:	None
Doses	:	500, 1,250 or 2,500 ppm barium chloride dihydrate in drinking water corresponding to daily doses of 15, 30 or 60 mg Ba/kg body weight for males and 15, 45 or 75 mg Ba/kg body weight for females.
Control group	:	Yes, concurrent vehicle
Result	:	negative
Method	:	Other
Year	:	1994
GLP	:	no data
Test substance	:	As prescribed by 1.1-1.4
Method	:	60 per sex per dose; Measurements included survival, body weight, water consumption, clinical signs to toxicity, hematology, clinical chemistry and pathology. At 15 months, the plasma barium concentrations were determined. Barium levels on bone were also determined in the high dose group.
Results	:	Two-year survival was similar to controls. Final mean body weights were decreased at 2,500 ppm by 5% in males and 11% in females. Water consumption was decreased starting as early as week 5 in both sexes at the high dose. There were no clinical signs that could be related to treatment. No hematology or clinical chemistry changes were noted. In the special study at 15 months, plasma barium levels were significantly increased in males at the 1,250 and 2,500 ppm and in all treatment groups in females. Barium levels in bones of rats in the high dose group were 400 times greater than controls at the 15 month interval. There were no increases in neoplasms or non-neoplastic lesions that could be attributed to the test material. However, a dose-related increase occurred in adrenal medulla pheochromocytomas and in mononuclear cell leukemia in male rats.
Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP. Barium was classified as Group D (not classifiable as to human carcinogenicity) (information from EPA Integrated Risk Information System (IRIS).
Reliability	:	(2) valid with restrictions Comparable to guideline study with adequate documentation.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.

Species	:	Mouse
Strain	:	B6C3F1
Sex	:	Male/female
Route of admin.	:	Drinking water
Exposure period	:	104 weeks (females) or 103 weeks (males)
Frequency of treatment	:	Continuous
Post exposure period	:	None

Doses	:	500, 1,250 or 2,500 ppm barium chloride dihydrate in drinking water corresponding to daily doses of 30, 75 or 160 mg Ba/kg body weight for males and 40, 90 or 200 mg Ba/kg body weight for females.
Control group	:	Yes, concurrent vehicle
Result	:	Negative
Method	:	Other
Year	:	1994
GLP	:	No data
Test substance	:	As prescribed by 1.1-1.4
Method	:	Measurements included survival, body weight, water consumption, clinical signs to toxicity, hematology, clinical chemistry and pathology. At 15 months, the plasma barium concentrations were determined.
Results	:	Two-year survival in both sexes at the high does was significantly lower than control due to renal toxicity. Final mean body weights were decreased at 2,500 ppm by 9% in males and 12% in females. Water consumption was similar to controls. There were no clinical signs that could be related to treatment. No hematology or clinical chemistry changes were noted. In the special study at 15 months, plasma barium levels were significantly increased in all exposure levels. There were no increases in neoplasms, but the incidence of hepatocellular adenoma was significantly decreased in male mice at the high dose. There was also a dose-related increase in nephropathy in both sexes.
Remark	:	Although not stated in the summary, the NTP study was likely conducted according to GLP. Barium was classified as Group D (not classifiable as to human carcinogenicity) (information from EPA Integrated Risk Information System (IRIS).
Reliability	:	(2) valid with restrictions Comparable to guideline study with adequate documentation.
Reference	:	National Toxicology Program. (Jan. 1994) Toxicology and Carcinogenesis Studies of Barium Chloride Dihydrate (CAS No. 10326-27-9) in F-344/N Rats and B6C3F1 Mice (Drinking Water Studies). TR-432.

5.8.1 TOXICITY TO FERTILITY

Type	:	One generation study
Species	:	Rat
Strain	:	Other: F344/N
Sex	:	Males/females
Route of admin.	:	Drinking water
Exposure period	:	60 days prior to mating
Frequency of treatment	:	Continuous
Premating exposure period	:	Male: 60 days Female: 60 days
Duration	:	Through delivery
Number of Gen Studies	:	One
Doses	:	1,000, 2,000 or 4,000 mg/L
Control group	:	Yes, concurrent vehicle
Result	:	
Method	:	other
Year	:	1992
GLP	:	No data
Test substance	:	other TS

Method	:	Rats were exposed for 60 days followed by an 8-day mating period. Measurements included: weekly body weight, water consumption, fertility index, fetal and maternal toxicity, developmental toxicity in fetus and neonates
Results	:	There were no indications of reproductive or developmental toxicity. However, there were below normal pregnancy rates in all groups including unexposed controls.
Remark	:	A 1977 study by Tarasenko resulted in a shortening of the estrus cycle in rats exposed to 13.4 mg of barium carbonate/m^3 for 4 months when compared to controls. This study also found an alteration in the proportion of mature and dying ovarian follicles and an increase in underdeveloped offspring that showed considerable mortality and slow weight gain during the first two post-natal months. These results were not seen at a lower dose of 3.1 mg/m^3 (summarized in WHO document)
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Sufficient experimental details present as a summary in a peer reviewed source
Reference	:	WHO Environmental Health Criteria 107, Barium (1990)

Type	:	One generation study
Species	:	Mouse
Strain	:	B6C3F1
Sex	:	Males/females
Route of admin.	:	Drinking water
Exposure period	:	60 days prior to mating
Frequency of treatment	:	Continuous
Premating exposure period	:	Male: 60 days Female: 60 days
Duration	:	Through delivery
Number of Gen Studies	:	One
Doses	:	500, 1,000 or 2,000 mg/L
Control group	:	Yes, concurrent vehicle
Result	:	
Method	:	other
Year	:	1992
GLP	:	No data
Test substance	:	other TS

Method	:	Mice were exposed for 60 days followed by an 8-day mating period. Measurements included: weekly body weight, water consumption, fertility index, fetal and maternal toxicity, developmental toxicity in fetus and neonates
Results	:	There were no indications of reproductive or developmental toxicity. However, there were below normal pregnancy rates in all groups including unexposed controls.
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Sufficient experimental details present as a summary in a peer reviewed source
Reference	:	WHO Environmental Health Criteria 107, Barium (1990)

5.8.2 DEVELOPMENTAL TOXICITY/ TERATOGENICITY

Species	:	rat

Sex	:	male/female
Strain	:	other: F344/N
Route of admin.	:	Drinking water
Exposure period	:	60 days prior to mating
Frequency of treatm.	:	Continuous
Duration of test	:	Through delivery
Doses	:	1,000, 2,000 or 4,000 mg/L
Control group	:	yes, concurrent vehicle
NOAEL maternal tox.	:	
NOAEL teratogen.	:	
Method	:	Other
Year	:	1992
GLP	:	Yes
Test substance	:	Other TS
Method	:	Rats were exposed for 60 days followed by an 8-day mating period. Measurements included weekly body weight, water consumption, fertility index, fetal and maternal toxicity, developmental toxicity in fetus and neonates.
Result	:	There was no indications of reproductive or developmental toxicity.
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Sufficient experimental details present as a summary in a peer reviewed source
Reference	:	WHO Environmental Health Criteria 107, Barium (1990)
Flag	:	Critical study for SIDS endpoint

Species	:	Mouse
Sex	:	male/female
Strain	:	B6C3F1
Route of admin.	:	Drinking water
Exposure period	:	60 days prior to mating
Frequency of treatm.	:	Continuous
Duration of test	:	Through delivery
Doses	:	500, 1,000, or 2,000 mg/L
Control group	:	yes, concurrent vehicle
NOAEL maternal tox.	:	
NOAEL teratogen.	:	
Method	:	Other
Year	:	1992
GLP	:	Yes
Test substance	:	Other TS
Method	:	Mice were exposed for 60 days followed by an 8-day mating period. Measurements included weekly body weight, water consumption, fertility index, fetal and maternal toxicity, developmental toxicity in fetus and neonates.
Result	:	There was no indications of reproductive or developmental toxicity.
Test substance	:	Barium chloride dihydrate
Reliability	:	(2) valid with restrictions Sufficient experimental details present as a summary in a peer reviewed source
Reference	:	WHO Environmental Health Criteria 107, Barium (1990)
Flag	:	Critical study for SIDS endpoint

5.8.3 TOXICITY TO REPRODUCTION